

GD World

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3

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Breaking the Surface



Climbing to Altitude



Wings Extended

GD Tomahawk Wins Navy Contract

Following a spectacular series of boost-to-glide tests last month, General Dynamics' unusual cruise missile concept was chosen by the U. S. Navy for its Tomahawk program.

In an announcement Mar. 17, the Navy said it had selected Convair Division as prime contractor for the program and issued it a \$34.8 million contract for the complete integration of subsystems into the prototype missile.

The contract calls for the first fully powered flight of the Tomahawk prototype missile next month.

The Navy announcement of Convair's selection as Tomahawk prime contractor came as GD World was going to press. Additional information about this exciting new program will appear in the next edition of the World.

The strategic and tactical guidance systems will be integrated into prototype missiles and flown as complete weapons systems early next fall.

Convair Division and LTV have been competitively developing the Tomahawk since early January 1974. The competition culminated in a series of 14 demonstration tests.

Like A Giant Roman Candle

By Jack Isabel

All of a sudden there it was, emerging from the water, its booster engine spewing brilliant red-orange flame like a giant Roman candle. Then, the slender body of the cruise missile clearly visible against the Pacific horizon as it arched downrange.

Success! In just a little more than 30 seconds, three years of work on the Tomahawk program was proved.

Events leading up to launch time were fast paced. On the short hop from San Diego to San Clemente Island with Program Director Ralph MacKenzie, marketing's Joe Basquez and Bob Dietz of the cruise missile engineering staff, talk centered around the weather. The Tomahawk launch had already been set back a full week because of torrential rains and the sky was still leaden — and it was Friday the 13th. No day for those with triskaidekaphobia (fear of the number 13)!

We spent part of the morning on a down-island run aboard a Navy launch

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The competition included underwater launches, launches of boost test vehicles, shock tests that duplicated depth charging, full-scale power wind tunnel tests and full-scale radar cross-section measurement of flight quality vehicles.

Two of the 14 tests were spectacular underwater launches of the GD missiles held on Feb. 13 and 15 at the Naval

Undersea Center, San Clemente, Cal. GD's missiles were launched from a submerged torpedo tube, rose through the surface of the water, extended their tails and wings as they climbed to an altitude of 1,100 feet, then glided over the test range for about two miles.

According to Ralph MacKenzie, GD-

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Photo by Bob Smith

I Christen Thee. General Dynamics Chairman David S. Lewis watches as Mrs. Victoria Hruska, wife of U.S. Senator Roman L. Hruska (Neb.), smashes the traditional bottle of champagne over the bow of the attack submarine USS Omaha during Feb. 21 christening and launching ceremonies at the Electric Boat Division. The Omaha is the second of 18 high-speed 688-class submarines under contract at EB to be launched.

USS Omaha Launched; Keel for Jacksonville Laid

Over 10,000 invited guests, Navy officials and Electric Boat Division employees and their families watched as Mrs. Victoria Hruska, wife of U.S. Senator Roman L. Hruska (Neb.), swung the traditional champagne bottle to christen the new high-speed attack submarine USS Omaha during launching

ceremonies at Groton, Feb. 21.

The nuclear powered Omaha is the second of the eighteen 688-class attack submarines under contract at EB to be launched. The first of the eighteen, the Philadelphia, was launched in late 1974 and is scheduled for delivery to the

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Navy Orders 4th Trident

The last few days of February were hectic at the company's Electric Boat Division. While preparing for the Feb. 21 ceremonies marking the launch of the high-speed attack submarine Omaha and the keel laying of the Jacksonville the division was notified that it had been awarded a \$225.6 million contract to build a fourth Trident ballistic missile-firing submarine.

And on Wednesday, Feb. 25, at a press conference at the Pentagon, Secretary of the Navy J. William Middendorf II announced that the first of the giant Tridents will bear the name Ohio when it is commissioned in the late 1970s.

The new award to EB brings the total value of the contract for construction of the four Tridents to \$984.8 million.

The Tridents will be the world's most powerful submarines. With a surface displacement of 16,800 tons, they are larger than World War II type cruisers, and significantly larger, quieter and faster than the Polaris and Poseidon missile-firing submarines now in service.

Krantz Named Gen. Manager

Frederick H. Krantz has been named vice president and general manager of General Dynamics' Electronics Division.



Krantz

manager since January, 1976.

Prior to joining the company, Krantz was with the RCA Corporation's Government and Commercial Systems Division in Van Nuys, Calif., where he served as vice president and general manager.

Before joining RCA, he was with IBM Corporation for seven years in a variety of management positions, and was also previously associated with Burroughs Corporation.

Pedace Debuts With Launch Of USS Omaha

Nobody could hear it over the cheers, whistles and strains of "Anchors Aweigh," but one person breathed a heavy sigh of relief as the *Omaha* knifed neatly into the Thames River.

That person was William B. Pedace, who was finishing his maiden voyage as launch coordinator just as the *Omaha* was starting her maiden voyage, albeit unpowered, as a submarine.

Pedace's sigh was well deserved. He was at the helm of an EB spectacular — no small responsibility.

He'd been rehearsing for two months — shortly after he took over the job, and other duties, from retiring Robert B. Chappell Jr., who had coordinated the last 41 launchings. Chappell's assistant for many of these events, Pedace would be the head man now, with Chappell along as consultant and adviser.

"I don't mind saying I was scared," smiles Pedace, an affable 39-year-old six footer. "Assisting at launchings is one thing. Leading them is another ball game entirely."

The launch director's job consists of describing over a public address system action on the christening platform shortly before the launch, making the 10-second countdown, and pushing the launch button to signal a trigger man to release the ship for its slide down the ways. The time involved is only about two minutes, but they're probably the most important minutes of the ceremony.

To prepare for his demanding task, Pedace, who had never handled a microphone in front of a large audience before, spent several evenings at home listening to tapes of previous launchings, especially the countdowns. "I worked mainly on enunciation and mod-

ulation," he says. "There's a real art to speaking into a booming PA system."

As the big day loomed closer, Pedace began losing weight. With the launching still a week away, he had lost 15 pounds.

"I was beginning to wonder whether I was really cut out for the job after all," he laughs.

Actually Pedace's job entails a variety of duties. As Chief of Division Special Services, he coordinates all special events at EB. This includes invitations to events, seating placement of dignitaries, and a myriad of related details.

Two days before the launching, Pedace, Chappell and others directly involved with the technical aspects of the launching gathered in front of the *Omaha* for a dry run.

Pedace took his position with the microphone and Chappell set the stage. "Pretend you're the sponsor," he said to one person. He motioned to another. "And let's say you're Mr. Lewis. Walk up the stairs to the platform so Bill can go through his commentary."

As the stand-ins ascended the stairs, Pedace began. "Now Mr. Lewis is escorting the sponsor up to the platform for the christening . . ."

"Wait, Bill . . ." Chappell walked over to Pedace and, gesturing, gave him some pointers. "That's good, but talk just a bit slower, and keep your voice up."

Pedace then practiced the countdown. "Ten . . . nine . . . eight . . . seven . . . six . . . five . . . four . . . three . . . two . . . one . . . launch!"

After the dry run, onlookers gently chided Pedace, a familiar figure after 20 years at the shipyard. "Hey Bill," one launch crew member shouted, "be sure

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From the Chairman . . .

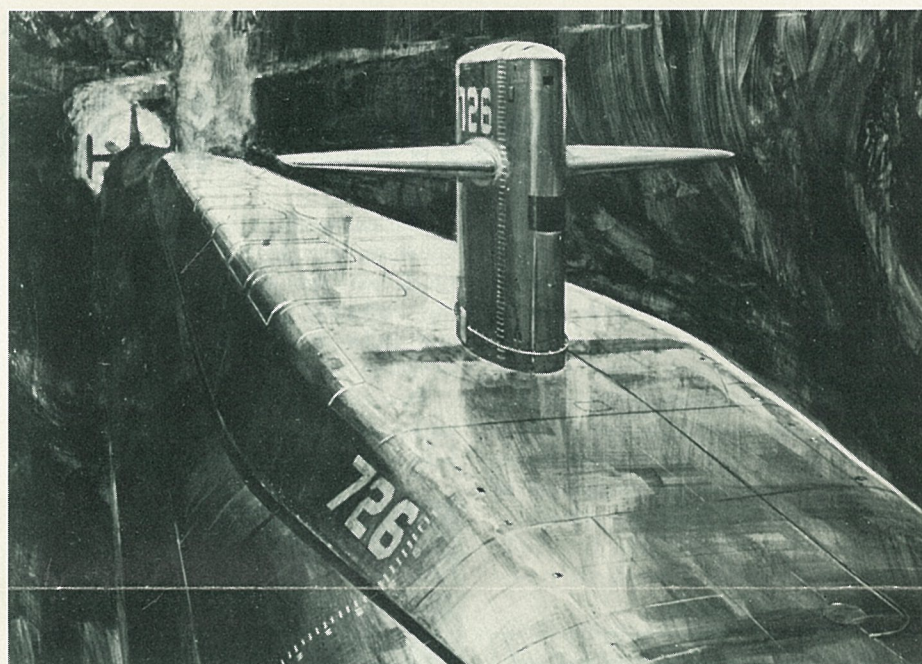
Equal Employment Opportunity continues to be an integral part of our management philosophy at General Dynamics. We recruit, hire, train and promote persons in all job classifications without regard to race, color, religion, sex, age or national origin, except where sex is a bona fide occupational qualification.

We will base decisions on employment so as to further the principle of equal employment opportunity. We will insure that promotion decisions are in accord with principles of equal employment opportunity by imposing only valid requirements for promotional opportunities. We will insure that all personnel actions such as compensation, benefits, transfers, layoffs, return from layoff, company sponsored training, education, tuition assistance, social and recreation programs, will be administered without regard to race, color, religion, sex, age or national origin.

As a result of our policy of non-discrimination, we have made significant progress in increasing our representation of minority group people and women in all of our major job categories. We are committed to specific Affirmative Action goals at each of General Dynamics' principal operations and facilities. We must see that equal opportunity exists in fact as well as in policy. Every applicant and employee must have the same chance for employment and opportunity as any other employee.

Affirmative Action is a responsibility of us all. A commitment to Affirmative Action cannot be taken lightly. I am committed and I expect all members of our management team to work with me.

A. J. Lewis



New Breed of Submarine. An artist's concept of the *Ohio*, the first Trident submarine to be named. The keel for the huge submarine, 560 feet long with a surface displacement of 16,800 tons, will be laid at Electric Boat on April 10. Electric Boat now has contracts totalling \$984.8 million to build the first four of the planned 11-ship Trident fleet. (See Story Page 1)

Cruise Missile Success . . .

(Continued from page 1)

Convair cruise missile program director, those tests of the missile verified ignition and performance of the solid propellant boost motor in water and in air; substantiated design characteristics associated with boost flight and automatic deployment of the wings and tail; and tested the stability of the air-frame in its flight configuration.

An imaginative part of the Convair design was that the missile is housed in a protective stainless steel capsule which is jettisoned at launch. This innovative approach allowed Convair to concentrate all protective features in this disposable

capsule instead of penalizing the flight performance of the missile with added weight.

At a press conference held at Convair's Kearny Mesa plant, Grant Hansen, corporate vice president and Convair general manager, said the award of the Tomahawk Cruise Missile contract is good for Convair, the community and the country.

"It will have a significant impact on the San Diego economy in that this program will provide 2,000 jobs at Convair if the Navy decides to go into full-scale production," Hansen said. "It is a shot in the arm for this division."

New Sub Launch . . .

(Continued from page 1)

Navy later this year.

Immediately after the launch, Mrs. Dorothy J. Bennett, wife of U.S. Representative Charles E. Bennett (Fla.), welded her initials on the keel plate of the *Jacksonville*, a sister ship of the *Omaha*, to signify start of construction on that ship.

The enthusiastic crowd, buoyed by the unusually warm February weather and a beaming sun, crowded the seven-story-high submarine construction building and the new land-level construction facility to witness the ceremonies and watch the 6,800-ton *Omaha* slide into the Thames River.

Mrs. Hruska broke the metal-encased champagne bottle over the gaily decorated bow of the *Omaha* as the crowd cheered and the U.S. Coast Guard band played "Anchors Aweigh."

The *Omaha's* bow was covered for the ceremony with a painting of a proud American Indian chief surrounded by a circle of red, white and blue stars and stripes.

Mrs. Bennett, outfitted in a leather welder's apron, welder's gloves and a face shield, inscribed her initials on the keel of the *Jacksonville* before the ap-

proving eyes of her husband, Rep. Bennett; Admiral James L. Holloway III, Chief of Naval Operations; Admiral Hyman G. Rickover, Director, Naval Nuclear Propulsion Program; GD Chairman David S. Lewis; and other guests.

The christening and launch ceremonies were photographed by a U.S. Navy combat camera crew for a television program which was shown in the city of Omaha two days later.

Other honored guests at the "double-header" ceremony included Gary D. Penisten, Assistant Secretary of the Navy (Financial Management); U.S. Representatives John Y. McCollister (Neb.) and William V. Chappell Jr. (Fla.), and the mayors of Omaha and Jacksonville.

The *Omaha* is the third naval vessel and the first submarine to bear the Nebraska city's name. The first was a wooden, steam-powered sloop-of-war which served from 1872 until 1914. The second was a light cruiser that won a battle star for its World War II exploits.

The *Jacksonville* is the first naval vessel to carry the name of that city, a deepwater port which serves as the site of a Navy station and major Naval air complex.

600 Flights Later, F-16 Marks Major Flight Milestones

The General Dynamics F-16 Air Combat Fighter is going places fast.

Two years after its first flight in the United States Air Force's lightweight fighter program, two F-16 prototypes have accumulated over 600 flights, over 700 hours of flight time and over 22 hours of supersonic flight.

Twelve pilots have flown the two F-16 prototypes to these marks on two continents. In a major milestone of the first two years of test flight, prototype Number One (01567) flew 52 times in 50 days during the European tour program in 1975. Aircraft Number One, with General Dynamics' Chief Test Pilot Neil R. Anderson at the stick, opened the successful tour with an aerobatic display at the Paris Air Show in May. Then, Anderson and U.S. Air Force Lt Colonels M. R. "Duke" Johnston and James G. Rider put on similar aerial displays in Belgium, Denmark, England, Germany, The Netherlands, Norway and Spain.

The two prototype F-16s have met or surpassed all of the design goals set by the U.S. Air Force. The flight test program progressed so well that prototype Number One has been dedicated to a separate endeavor, the U.S. Air Force Flight Dynamics Lab's Fighter Control Configured Vehicle (CCV) program.

The CCV Program will use prototype Number One as a test bed to explore new and additional uses of aircraft control surfaces to achieve better performance, less work load for the pilot, and

to develop the potential to fly an aircraft in combat maneuvers previously not possible.

While assembly of the first of the U.S. Air Force's eight full-scale development F-16s progresses at Fort Worth, prototype Number Two (01568) is continuing a very active flight test program in support of the full-scale development effort.

Here are some of the milestones the two General Dynamics YF-16s achieved following the first flight of Number One on Feb. 2, 1974, and the first flight of Number Two on May 9, 1974:

- First supersonic flight — Feb. 5, 1974
- Maximum speed attained — Over Mach 2 (August, 1974)
- Most flights in one day (YF-16 Number One) — 6 (July 20, 1974)
- Quickest turnaround time (Shutdown to engine start) — 6 minutes
- Greatest number of flights in one month — 52 (August, 1974)
- Maximum altitude attained — over 60,000 feet
- Maximum "g" attained — 9
- Longest flight without refueling — 2 hours 55 minutes
- Longest flight with refueling — 9 hours (Ramstein AB, Germany, to Langley AFB, Va., July 5, 1975)
- Total number of bombs dropped — 10 MK-84s, 24 MK-82s
- Total rounds of ammunition fired — nearly 22,000 rounds
- Total number of missiles fired — 7 AIM-9s

A/C-37 Boosts Intelsat IV-A—Perfect Orbit

An Atlas-Centaur launch vehicle boosted the second in a series of a new family of communications satellites into orbit Jan. 29 from the Eastern Test Range in Florida.

Both the Atlas and Centaur portions of the flight were flawless according to Bob Moberly, Convair mission manager for Intelsat launches.

The second Intelsat IV-A supplements the first in the series, which was launched last year. The new satellites complement the existing Intelsat IV worldwide network of seven operating satellites — all launched previously by Convair's famed Atlas-Centaur space booster.

The first of the IV-A satellites is being used to meet the demands of telephone, television and data transmissions between the United States, Europe and West Africa. After the second Intelsat IV-A is on station and checked out, the first will operate as the primary satellite in the Atlantic, functioning with more than 40 earth stations in North America, South America, Africa and Western Europe.

COMSAT Corporation manages the Intelsat program for an international consortium of more than 100 nations. NASA's Lewis Research Center manages the Atlas-Centaur vehicle.

Convair Employees View A/C-37 Launch



Elaine Whisman, statistical technician, and Al Quintard, engineering planning specialist, both from Convair, were enthusiastic spectators at the A/C-37 launch which boosted the second Intelsat IV-A spacecraft into orbit.

Their visit to the Eastern Test Range in Florida was the result of the launch vehicle program's motivation effort which recognizes people who excel in their work.

Quintard reported that it was particularly gratifying for him to share the successful end result of everyone's effort on Atlas-Centaur. "The tours of Complexes 36 and 41, including the towers, blockhouses, hangers and machine shops, were thorough and interesting. The countdown, launch viewing and subsequent reviews were icing on the cake," he said.

Miss Whisman said, "The opportunity to tour the launch site and actually see the enormity and complexity of the whole operation makes the individual's job back in San Diego more meaningful. The actual launch of A/C-37 can only be described as spectacular."



Lucky Seven. Faye Toler, launch vehicle programs logistics support (left), and Gil Reeves, launch vehicle programs production control, display the seventh DSA Performance Improvement Sustained Craftsmanship banner. From left back row: Col R. K. Bathke; Grant Hansen; Col R. C. Snively; BrigGen M. E. DeArmond; Rich Jumont; Col N. F. Zunic; and Jim Brown. Convair is the only company to win seven of the coveted awards.

Project MOVE Teaches Machine Shop Skills

As part of its continuing affirmative action effort, Convair Division is playing an essential role in applying its education and training expertise to instruct a number of minority men and women in the basic skills of machine shop operations.

Twenty trainees, including one woman, began classroom and shop instruction at Plant 19 last month in Project MOVE (Machine Operators Vocational Education), a San Diego Urban League activity designed to give minority men and women greater access to machinist careers.

"We found few minority machine operators in the labor market, primarily because they lacked the skills and knowledge to operate the machines utilized in the aerospace industry," said Gene Fox, Convair manager of equal opportunity programs. "As part of our Affirmative Action Plan we decided to institute a training program which would give minorities an opportunity to learn the machine trades."

Fox and Wayne Turner of educational services, who was instrumental in coordinating the effort for Convair, later learned that the Urban League was already considering such a program. "They were looking for a facility, machines and qualified instructors. We had all three," Fox said.

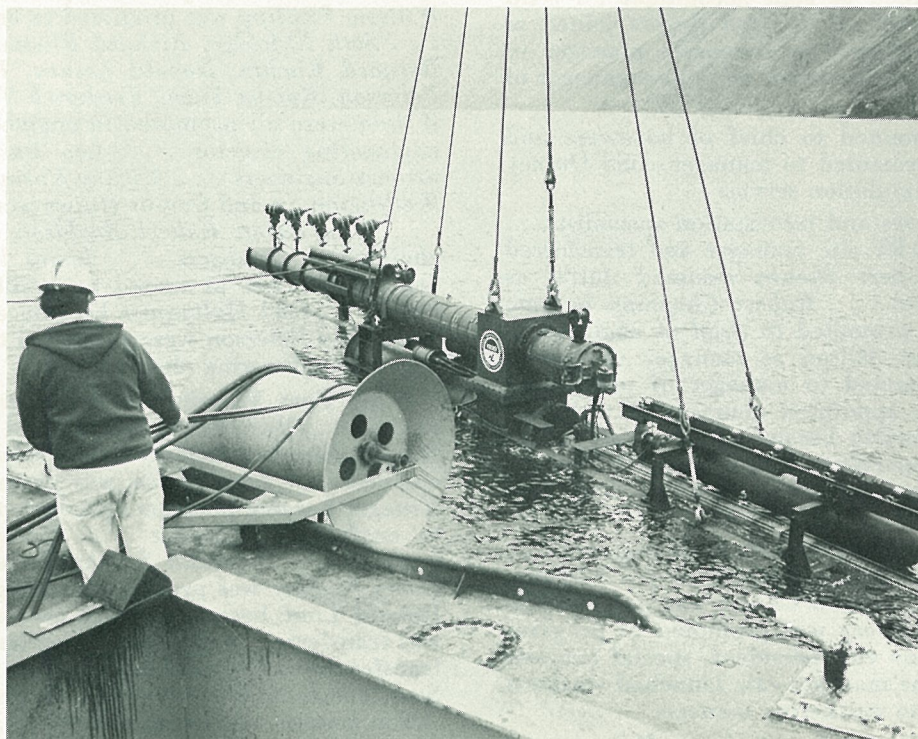
From then on, said Turner, it became a combined effort between Convair and the Urban League. Three other aerospace firms later stepped in to support the program, donating lesson texts, workshop materials and instructors. The instructors for the first group of trainees are Bob Moxley of Convair and Rick Dias, on loan from Solar Division — International Harvester.

The training period is scheduled to run 16 weeks and the trainees, screened and selected by the Urban League, will receive allowances from the Regional Employment Training Consortium while participating in the program.

Turner said the trainees will develop an understanding of modern methods and applications in basic machine shop operations. They will acquire a knowledge of shop theory and practices and will, upon completion of the course, have the ability to satisfactorily operate several of the basic machine tools, he said.

Bernard Ashcraft, Urban League associate director, employment services, said Project MOVE is one program the Urban League uses to stimulate employment in the community.

"We feel sure that Project MOVE will move men and women with marketable skills into meaningful jobs in the community," Ashcraft said.



Down She Goes. A GD Tomahawk cruise missile, installed in this torpedo tube, is lowered into the ocean at the Naval Undersea Center, San Clemente Island, Calif., prior to its successful boost-glide test. (See story page 1.)

Convair Wins 7th Consecutive DSA Award

Convair performance and quality were recognized last month when division employees received the Defense Supply Agency's Performance Improvement Sustained Craftsmanship Award, DSA's highest and most coveted honor for exceptional quality achievement.

General Dynamics' Convair Division is the only company in the nation, in any industry, that has won seven of the awards.

USAF BrigGen Michael E. DeArmond, commander of the Defense Contract Administration Services region in Los Angeles, presented the award and accompanying banner to Grant Hansen, corporate vice president and Convair Division general manager. "It is most noteworthy," Gen DeArmond said, "that this is the seventh DSA Performance Improvement Sustained Craftsmanship award which attests to your continued efforts in improving your EXCEL program."

In accepting the award on behalf of all Convair employees during a ceremony attended by more than 200 representative employees from Kearny Mesa, Lindbergh Field and Plant 19, Hansen said, "I'd like for us all to remind ourselves of the importance of not just the award itself but what is done to achieve the honor. Our customers expect quality products, they expect continuing improvement trends no matter how good we are already, and we understand and subscribe to those expectations."

The Defense Supply Agency incentive program is aimed at improving product quality by stimulating pride of workmanship.

Others participating in the award ceremony at Kearny Mesa included: Col R. K. Bathke, chief of DCAS at Convair; Col R. C. Snively, Atlas Special Projects Office, SAMSO; Rich Jumont, NASA resident office chief; Col N. F. Zunic, commander DCAS District in San Diego; and Jim Brown, Convair director of quality assurance.

Adams Named 'Salesman of Year'

Fort Worth, Texas has named Richard E. Adams "Sales Person of the Year" for 1975. Adams, vice president and general manager of the Fort Worth Division, accepted the Victor Trophy, symbolic of the honor, on Feb. 17 at the 47th annual Distinguished Salesman's Award banquet. The honor was bestowed jointly by the Fort Worth Sales and Marketing Executives and the Chamber of Commerce.

Service Awards

FORTY-YEARS:



Operations — Bob Hoover

THIRTY-FIVE YEARS —

Operations — E. W. Stelmach, B. E. Ahring, J. M. Adamson, G. E. Armstrong, R. F. Friar, V. L. Akers, F. L. Biscak, H. F. Whisman, R. C. Trout, J. M. Opocensky, M. O. Ramsey.

Research and Engineering — W. P. Espinosa, M. W. Montgomery, L. J. Koenig, A. Avgerenos.

Launch Vehicle Programs — C. T. Brown.

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Rochester's Wizard Leaves for Norwich

By Bob Ford

The wizard of Carlson Road is leaving Rochester but promises to keep in touch.

An IBM 370/155 computer operated for Stromberg-Carlson by the company's Data Systems Services (DSS) will pick up its tapes early this year and silently whirl away, its functions to be performed by an even bigger, faster machine located in Norwich, Conn., and connected to S-C plants by the umbilical cord of a high-speed telephone line.

The move is the final phase of consolidation of all General Dynamics' data processing services into three regional centers located in San Diego, Calif., Fort Worth, Tex. and in Norwich.

Data Systems Services, known in computerese as "DS squared," is a department of General Dynamics. It was established in 1972 to bring the computer services of all GD divisions and subsidiaries under one wing, thereby standardizing these services and offering an economy-of-scale. It was introduced in in Rochester in 1974.

As part of the Eastern Region, DSS at S-C now reports to the Eastern Data Systems Center at Electric Boat in Groton, Conn. This center will move to Norwich later this year.

"The DSS group at S-C is unique in General

Dynamics," said William D. Horan, manager of DSS in Rochester. "We are the only division providing computer services to several satellite plants in addition to the headquarters plant."

S-C plants in Ardmore, Okla., and Sanford, Fla., are equipped with terminals connected to the computer in Rochester. When the S-C headquarters computer is removed, they all will be connected to the Norwich computer by a terminal.

According to Horan, the number of DSS personnel remaining in Rochester will depend upon the work load. At present, there are approximately 130 people in the DSS group at S-C, many of them assisting in the move.

The Rochester computer currently operates 24 hours a day, seven days a week, and much of that time is spent transferring data to the computer in Groton. Eventually, all that data will go to Norwich.

Best known, and undoubtedly most popular of the many DSS services to employees is the production of paychecks. Payroll data already has been transferred to Groton, but the checks are printed by the terminals and high-speed printers in four S-C plants. The only S-C plant not using this service is the one in Camden, Ark.

Another major program is MRP, short for material

requirements planning. This is a method of material control that enables a company to keep fewer parts on hand.

"MRP is simply a better management tool," according to Garrett McClung, chief of management systems for DSS at S-C. "With it, we have less inventory and better identification of future requirements for parts. The savings are in the millions of dollars."

S-C's national distribution system is controlled through DSS terminals all over the country to keep track of sales and of finished goods inventory. This complex network took three years to implement from the initial idea.

"The computer really assists management and keeps better records," Horan pointed out. "For speed and accuracy, it can be compared to the electric typewriter matched against the monk with a quill pen."

"We estimate that the computer provides a value ratio of 11 to one in savings versus other methods."

Regardless of comparisons, one thing is obvious. It would take an infinite number of monks with an infinite number of quill pens to match the 45 to 50 million lines of print the Rochester computer has been cranking out each month, and which will continue in Norwich when the new center is opened.

Pedace Debuts With USS Omaha

(Continued from Page 2)

you don't go 10 . . . 11 . . . 12 . . . instead of the other way. And be sure to push the launch button!"

Then came 1:15 Feb. 21, and the *Omaha* was on her way to the water. Pedace had batted 1,000.

Then came the sigh, but his work wasn't over. Immediately following the launching, Pedace coordinated the keel laying of the *Jacksonville*, a sister ship of the *Omaha*.

His work day ended at 5:30 p.m. when he saw the last planeload of dignitaries off to Washington from Groton's Trumbull Airport.

What did he think about on the 45-minute drive from the airport to his house? The answer comes through a grin.

"I was mulling over arrangements for the Trident keel laying. . ."

Tomahawk Rose Like A Giant Roman Candle

(Continued from Page 1)

with representatives from the Naval Undersea Center (NUC). The boat took us by the barge whose derrick already had lowered into the water the loaded torpedo tube from which the Tomahawk would be fired.

Bob Lynch, Convair's chief engineer on the program, told us that the company's test crew had been up since 4 a.m., readying the boost test vehicle for transport to the barge and loading into the torpedo tube. Others assigned to support the launch, we were told, went on station before dawn at various sites along the range.

Lynch said we'd be watching the Tomahawk firing from Stone, one of the highest points along the San Clemente

test corridor. Uprange at Station Jack, company and Navy photographers, challenging a brisk wind, were set up to document the shot from vantage points along the jagged cliffs.

From atop Stone, we had a panoramic view of the entire range. Earlier concerns for adequate ceiling were forgotten. It was slightly overcast but not enough to pose a threat to the launch which, the crackle of a radio reminded us, was just 15 minutes away.

At T-minus one minute the General Dynamics and NUC observers moved closer to Stone's edge, eyes fixed on the barge uprange. Then, the long 60-second wait for indications of success.

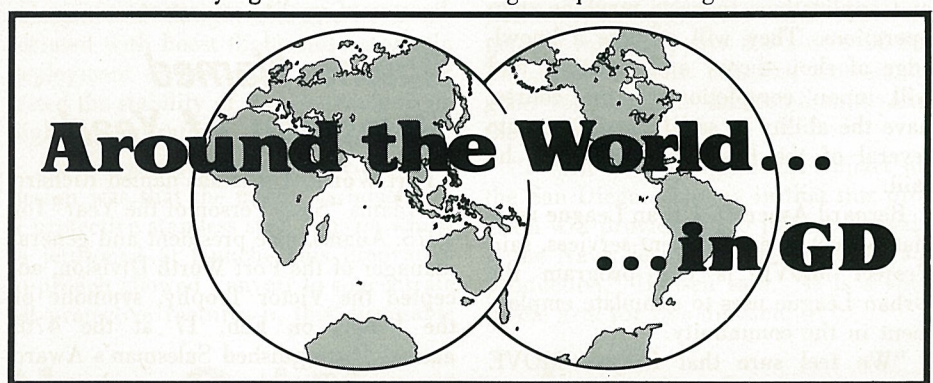
And there it was!!

James Murphy New Director

James J. Murphy has been promoted to director-Europe, headquartered in Brussels, Belgium, replacing Jack Phelan, who returned to the United States after nine years of service in the International Department.

In his new, Brussels-based position, Murphy is charged with the direction and coordination of all corporate marketing activities in Europe, as well as supporting and assisting company efforts in the European F-16 program.

Murphy brings several years of GD experience to his new post; he joined the company in July, 1969 as a corporate management intern and in August, 1970 became a marketing specialist in the International Department. More recently, Murphy was marketing manager-Europe where his primary responsibility was to sell the F-16.



At CHQ: James Budros retired after 35 years with the company . . . Algie Hendrix retired after 13 years . . . Lou Whitney was promoted to corporate manager-personnel placement . . . Robert Gervasini became internal auditor . . . Maureen Kuo joined as staff accountant . . . Ed Panichas joined as corporate labor counsel . . . Clinton Beyers joined as proposal analyst . . . Norman Goldman joined as corporate manager of employee benefits - insurance . . . G. Alexander Smith joined as manager of internal communications.

At DSS: Kenneth Packer was promoted to chief of hardware and software EDSC . . . Harry Turner was promoted to manager - DSS Quincy . . . Guy Mabie became chief - test and simulation service . . .

At EB: Jim Reyburn rejoined as news and information specialist . . . Frederick Kraemer was promoted to MARF site manager and transferred from West Milton to Groton . . . Robert Skewes assumed duties as manager - installation and material control . . . Robert Chapman became principal engineer . . . Walter Ford was promoted to chief of engineering . . . Jonah Rash transferred from West Milton as manager of special projects . . . Louis DeMartino was promoted to manager of production planning . . . Norman Pettini has been appointed manager of technical publications and graphics . . . Arnold Jordan became chief of operations . . . Allan Atwood assumed duties as supervisor of technical illustrations . . . Gerard Johnson became manager - operations analysis and cost control . . .

At Pomona: Aime Puntous was promoted to industrial engineer . . . Paul Savco assumed duties as chief experimental inspector . . . Jerome Cantwell joined as marketing manager . . . Frank Chesus was promoted to vice president - operations . . . Ralph Geisberg was promoted to program director - Sparrow . . . Harold Yost became vice president - special projects . . . Charles Mimbbs transferred to CHQ as manager - air launched weapons systems . . . Albert Davis was promoted to marketing manager . . .

At Quincy: P. Takis Veliotis addressed the St. Louis Management Club on February 19 . . . Arnold Hoines was transferred to Quincy from Charleston as manager of outfitting . . .

At S-C: Richard Chapple was promoted to manager - NSL marketing

. . . Stephen Paris became manager - product management support . . . Joseph D'Adamo assumed duties as manager of planning . . . William Smiley was promoted to manager - COE systems . . . Warren Ellis was promoted to regional sales administrator . . .

At Datagraphix: David L. Buck assumed duties as manager of software support in San Diego . . . David P. Buck was promoted to St. Louis district sales manager . . . Dick Malsbary transferred from Oakland office to the San Diego sales manager's marketing staff . . . Randy Simmons became Oakland district sales manager . . . Harold Suiter became manager of pricing and transferred from SCCC . . .

At Electronics: Daniel Paukovec transferred to CHQ as program control specialist - DSS . . . Donald Sullivan rejoined as program manager - HATS . . . Alex Wong joined as principal engineer . . .

At Convair: Gus Grossaint became production manager - European program office and was transferred to Fort Worth . . . John Drewett assumed duties as project manager and was transferred to Fort Worth . . . William Phillipp was promoted to engineering director - test and evaluation . . . Seth Eldridge, Richard Bloom, Richard Huntington, Richard Jones, Bernard Kuchta, Donald Lesney, Robert Nelson, Robert Packer, David Peterson, Robert Tatro, Frederick Taylor, George Theilacker and Richard Wilson were all promoted to engineering chief . . . Frank Anthony became engineering director . . . Leo Buss and John Silverstein became chief project engineers . . . Mickey Cornwall, Harry Eastman, Harry Obertreis, Wellington Su and Dennis Huber were promoted to senior project engineers . . . John Fagar, Robert Harbison and William Shine assumed duties as engineering managers . . . James Heffron became project engineer . . . John White was promoted to facilities specialist - DSS and transferred to CHQ . . . Carl Holinquist became engineering director . . . Mark Dorian and David Peterson were promoted to engineering managers . . . Ruel Weas became engineering chief . . .

At Fort Worth: William Buntin was promoted to engineering director . . . Clyde Crawford assumed duties as engineering chief . . . Larry Hove rejoined as engineering specialist . . . Ronald Jennett became group engineer . . . Larry Jones was promoted to engineering director . . . Rolf Krueger became manager - product planning . . . Robert Lee was promoted to engineering director . . . Horace Romero assumed duties as group engineer . . . Reginald Sanchez became manager of quality assurance . . . Harry Stucker was promoted to program director - electronic programs . . . Donald Lind became project aero-systems engineer . . . Enrique Gomez was transferred to Dayton as Dayton representative . . . Lonzie Parker was transferred to Central Data Systems Center as a data systems specialist . . . Sam Abraham was promoted to project operations analyst . . . Richard Allen became design specialist . . . Edwin Berkonski assumed duties as project structures engineer . . . Henry McDonald was promoted to project manager . . . Richard Newhouse and Orlando Wood became project aero-systems engineers . . . George Laureyns was promoted to engineering staff specialist . . . Bill Kelly was promoted to design specialist . . .

Lewis Tells Shareholders:

GD Is 'Strong, Vital and Aggressive'

Ceremony Marks Ohio Keel Laying

It took slightly more than three minutes to lower the 110-ton keel of the *Ohio* one inch to mark the beginning of construction of the world's largest missile-firing submarine. But it will take more than two years to complete the *Ohio*.

The ceremonial keel laying took place Apr. 10 in the new \$110 million Land Level Submarine Construction Facility at Electric Boat division before the eyes of an estimated 4,000 employees and guests.

Immediately after the mammoth keel was firmly resting on its supports, Mrs. Katharine Whittaker Taft, wife of U.S. Senator Robert Taft Jr. (R-Ohio), welded her initials in the keel plate with the assistance of the shipyard's senior welder, Eugene A. Callahan.

Prior to the keel laying, employees and guests saw demonstrations of the Land Level Facility's equipment which is used to lift and move huge submarine hull sections.

The *Ohio* is the first ship in the Trident class, which will be the fourth class of missile-firing submarines of the U.S. Navy. It is scheduled to be operational in 1979, about the time the first Polaris submarines will be 20 years old.

In his speech in the cavernous facility, Sen. Taft said that "deterrence must remain the foundation of our national security."

The Senator continued, "The Soviet Union has, over the past decade, thrown down the gauntlet to the United States in one of the greatest naval challenges history has ever seen, a challenge comparable to that offered to Britain by the Kaiser's Germany in the early part of this century."

"The *Ohio* will be a great and important part of our response to the Soviet challenge. In laying the keel of the *Ohio*, we say to the Soviet Union that America

Continued on Page 4

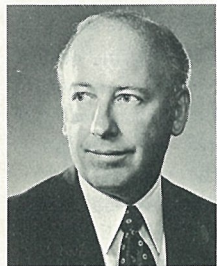
Muller Named Stromberg CEO

Leonard A. Muller has been named president and chief executive officer of Stromberg-Carlson. He succeeds Dause L. Bibby, who will remain as chairman until his retirement on June 30.

Muller had been president and chief operating officer of Stromberg-Carlson since January 1974.

Bibby, who served for nine years as president of Stromberg-Carlson and since 1974 as chairman and chief executive officer, was also president of St. Louis-based Stromberg-Carlson Communications, Incorporated.

William M. Lombardi, who had been vice president and general manager since November 1975 will succeed Bibby as president of Stromberg-Carlson Communications Incorporated.



Muller



The Trophy. "The genius of Man, having conquered Gravity and Contrary Winds and having touched the bird and found its secrets soars from the Earth a conqueror."

F-16 Team Awarded The Collier Trophy

The prestigious aviation industry honor, the Robert J. Collier Trophy, has been awarded to General Dynamics' Chairman David S. Lewis and the GD/Air Force team which helped to produce the F-16 Air Combat Fighter.

The Collier Trophy is often referred to as the "Oscar" of the aerospace industry.

It is given for the "greatest achievement in aeronautics or astronautics in America, with respect to improving the performance, efficiency or safety of air or space vehicles, the value of which has been thoroughly demonstrated by actual use during the preceding year."

This is the second time that General Dynamics has received this award. In 1959, General Dynamics' Convair division won the award with Space Technology Laboratories, Inc., and the U. S. Air Force for their contribution to the Atlas program.

The Collier Trophy, established in 1912 as the "Aero Club of America Trophy," was donated to the club by its then president, Robert J. Collier, a publisher and sports enthusiast who wanted to promote safety in aviation.

For years, stunt flights had been made to satisfy the morbid curiosity of crowds at the expense of aviator's lives.

Collier set up the trophy to recognize each year a "sounder contribution to the progress of American aviation than any

mere reward for speed and daring." The trophy weighs 525 pounds and is kept in the permanent collection of the Smithsonian Institution in Washington, D.C. Each recipient of the trophy is given a miniature to keep.

Except for the war years 1917-20, the Collier Trophy has been awarded annually for 60 years. The list of recipients reads like a Who's Who in aviation: Orville Wright, Glenn H. Curtiss, Lawrence D. Bell, Gen H. H. Arnold, Charles E. Yeager and Neil A. Armstrong.

Each recipient is chosen by the Robert J. Collier Trophy Committee which is appointed annually by the President of the National Aeronautic Association. The size of the committee is determined by the president of the NAA. The committee is guided by policies which have been approved by previous committees.

The award is given for that achievement which either in prototype or production type, manned or unmanned, has contributed to the efficiency, safety or performance of aeronautics or astronautics in America. The award may go to an individual, a group of individuals or to an organization.

Traditionally, the presentation of the trophy is made by the President of the United States at a White House ceremony.

In recent years, General Dynamics has re-established itself as a "strong, vital and aggressive organization," David S. Lewis, GD's chairman told shareholders at the annual meeting in St. Louis Apr. 13.

"We still have a long way to go to realize our full potential, but our present situation is good and getting better," he said.

Lewis noted that sales have increased for the past three years and are again above the \$2 billion mark, with a mixture of about 60 percent of sales in government contracts and a solid 40 percent in nongovernment work.

He reported to the 125 shareholders and guests that earnings for the first quarter were \$17.243 million or \$1.59 per share compared with \$13.735 million or \$1.31 per share for the first quarter of 1975 while sales for the quarter totaled \$568 million compared with \$510 million for the first period in 1975.

"All in all the picture at General Dynamics is a bright one," the chairman said. "We certainly have our challenges, but more than ever before we also have our opportunities. We intend to meet the challenges and capitalize on the opportunities in the years ahead."

At the end of 1975, the corporation had a record \$6.1 billion funded and unfunded backlog, but Lewis noted that only \$413 million of that figure is for the F-16 program.

Lewis emphasized to shareholders that the backlog has been built up "without resorting to the use of questionable agents, the bribing of government or customer officials or by making illegal political contributions."

He told shareholders that the policy of General Dynamics is for all "officers and employees at all levels to conform to the highest ethical standards of American business wherever we do business."

"This applies to me, this applies to all of our officers and this applies to all of our employees."

"The policy is clear," he said.

"We want to win new contracts on a profitable basis, but we are willing to give up those contracts and are willing to give up those profits if winning them

Continued on Page 4

Lynn Elected To GD Board

Edward E. Lynn, GD vice president and general counsel, was elected to the board of directors at the annual shareholders meeting on Apr. 13.

Lynn, a native of Coldwater, Kan., has been associated with GD since 1971.

He received his law degree from the University of

Illinois in 1947 and practiced for 10 years with the predecessor firm of the Chicago law firm, Jenner & Block. In 1957, he was named vice president of Fairbanks, Morse & Company, of Chicago, and four years later joined the Youngstown Sheet and Tube Company, as assistant general counsel.

He subsequently became general counsel, secretary and director of Youngstown Sheet and Tube.



Lynn

First F-16 Prototype Used As CCV Test Bed

An aircraft which can point its nose left or right and slide sideways by twisting a pair of fins astride its nose gear has commenced a seven-month test program at Edwards AFB, Cal.



The CCV With Canards

The aircraft, known as the Control Configured Vehicle (CCV), uses GD's F-16 Prototype No. 1 as a test bed.

A project of the Air Force Flight Dynamics Laboratory, the CCV aircraft can point its nose left or right, move sideways without banking and rolling, and execute wings-level turns—by deflecting

two canards, or fins, and its rudder simultaneously. The CCV points its nose up or down and rises and descends by coordinated movement of wing flaperons and horizontal tail. Traditionally, a pilot pulls back on the control stick to climb and pushes the stick forward to dive, then levels off at the desired altitude.

The canards are the only visible change to the aircraft. Each adds eight square feet of control surface and is mounted astride the F-16's air inlet. Hydraulic actuators which drive the canards are commanded by an auxiliary CCV flight control computer.

Fort Worth division modified the F-16 and is evaluating CCV flight characteristics under a \$6 million contract. The F-16 is an ideal test bed because it is a modern, high-performance aircraft with a fly-by-wire, computer directed flight control system compatible with CCV technology. The CCV aircraft has passed all initial functional checks of its unique handling qualities.

The CCV successfully completed its sixth flight with canards at Edwards AFB and now has flown a total of nearly 14 hours with General Dynamics CCV Program Pilot David J. Thigpen at the controls.

Pomona Wins Army Contract For Viper Antitank Weapon

A \$10.5 million contract from the U.S. Army Missile Command for development of the Viper, a new and powerful antitank weapon, has been received by Pomona division.

The Viper, a shoulder-fired rocket, weighs less than seven pounds, but has substantially greater tank killing capability than previous light antitank weapons. The compact weapon is only 27 inches long when carried and extends to 44 inches for firing.

The weapon's front and rear sights deploy automatically when the gunner extends the launching tube which holds the rocket. The gunner then simply arms the weapon, aims and fires. The launching tube is then discarded.

The new antitank rocket can be employed at ranges of from 10 to 500 meters.

Sparrow Missile Delivered to Navy

The first Sparrow AIM-7F missile built by General Dynamics was delivered last month to the U.S. Navy.

The air-to-air Sparrow was "sold off" Mar. 23 following rollout at the Pomona plant. The ceremony was attended by General Dynamics, Navy and Air Force representatives, and more than 100 management, production and support personnel assigned to the Sparrow program.

The AIM-7F missile will now undergo a series of tests to qualify General Dynamics as a second source producer of the all-weather, radar-guided Sparrow. Testing will be carried out at the Pacific Missile Test Center, Point Mugu, Cal.

Dr. L. F. Buchanan, corporate vice president and Pomona general manager, said the corporation has made available all of its capabilities to support the Sparrow program.

"We have called upon various divisions of General Dynamics during the course of the Sparrow effort to date and

Did You Know?

The ruthless use of submarine warfare by the Germans in World War I was ultimately responsible for the growth of the Electric Boat Company. As orders for submarines poured in, the stock soared, and in February 1916, the *Wall Street Journal* reported \$67.30 per share for both common and preferred stock.

they have all come through in great style," he said.

For example, the Convair division in San Diego is doing electron beam welding on Sparrow's midsection shell which is the housing for the flight control units. Electronics division in San Diego is working on the missile's forward antenna and the fuse antenna. Final installation of the fuse antenna into Sparrow's target seeker housing is also being done by Electronics.

"The rollout of the first Sparrow missile built by General Dynamics is a major milestone in the effort to establish a second source for Sparrow," said Capt Don Wells, Sparrow project manager, Naval Air Systems Command. "I extend to each of you my personal gratitude for a job well done."

Capt Wells called the initial Sparrow delivery "a team effort in the true sense of the word," and cited General Dynamics; the Naval Weapons Center, China Lake, Cal.; the Pacific Missile Test Center; the Fleet Analysis Center, Corona, Cal.; and the Naval plant representatives assigned to the Pomona division for the comprehensive effort.

"They all contributed significantly to this event," he said. "I'm looking forward to the future of the Sparrow program at General Dynamics and the good things that I know are going to come from it."



Air Launch. A Navy A-6 Intruder with a tactical version of the Tomahawk cruise missile under its wing, is shown prior to air launch of the missile over the Pacific Missile Test Center.

Tomahawk Cruise Missile Passes Air Launch Test

A tactical version of the GD Tomahawk cruise missile was successfully air-launched from a U. S. Navy A-6 Intruder over the Pacific Missile Test Center on Mar. 28.

The primary purpose of the test was to evaluate the structural integrity and flight handling qualities of the missile.

Several other objectives were met in the test including satisfactory separation of the missile from the launch aircraft, demonstration of the Tomahawk's aerodynamic capability to perform a tactical

mission, demonstration of the integrated aerodynamic/power plant performance and evaluation of the recovery system.

The launch, which was performed three weeks ahead of schedule, was made from an altitude of 11,500 feet, and the flight lasted 16 minutes.

Flight maneuvers, including left and right hand turns and altitude changes, were completed. The flight ended with wing retraction and the deployment of the missile's parachutes and flotation bags.

Tomahawk Trail Blazers . . .

1972

December: General Dynamics, LTV, Lockheed, Boeing and McDonnell Douglas awarded study contracts for a cruise missile.

1974

January: Naval Air Systems Command selects General Dynamics and LTV as competitive cruise missile air-frame contractors.

1975

March: First chips cut for test vehicles.

August: Convair completes captive flight vehicle.

September: Strategic structural test vehicle completed.

October: Full-scale wind tunnel development tests of captive flight vehicle completed at Arnold Engineering Test Center, Tullahoma, Tenn.

October: Convair Integrated Man-

agement System (CIMS II) approved for triservice use.

October: Official name of cruise missile becomes Tomahawk.

November: Static boost motor firings (air and underwater) completed.

1976

January: Wind tunnel demonstrations of integrated vehicle with engine operating.

February: Prelaunch shock demonstrations of strategic and tactical structural test vehicles made at Hunter's Point Naval Shipyard.

February: Underwater launch and boost-to-glide tests successfully made Feb. 13 and 15 at the Naval Undersea Center, San Clemente Island.

March: Cruise missile prototype flight vehicle no. 1 completed.

March 17: Navy selects General Dynamics as prime contractor for Tomahawk cruise missile.

Pomona Begins Assembly Work On Phalanx Weapon System

Assembly work on the Operational Suitability Model (OSM) of the Phalanx Close-In Weapon System has started at Pomona division.

Phalanx is a computer-controlled gun defense system designed for shipboard use against attacks by missiles or low-flying aircraft. Pomona has been developing this new generation gun system since 1969 for the U.S. Naval Sea Systems Command.

The robot-like Phalanx employs a six-barrel, rapid-firing Gatling gun which fires Pomona-developed projectiles. The specially designed rounds use a heavy-metal penetrator and inflict more damage on a target than ordinary ammunition.

In 1971, Pomona began fabrication of two Phalanx prototypes and completed them in 1973. The initial prototype was installed aboard USS *King* for at-sea firings and testing later that year. The second prototype is used for oper-

ation and maintainability training for Naval personnel.

Hank Mitman of the Phalanx Program Office said the OSM will be used for shipboard evaluation during operational tests. The model will incorporate all of the reliability and maintainability improvements that have been designed and tested so far in the program. Successful results of the operational trials are expected to initiate pilot line production of the system, Mitman said.

Phalanx has already successfully completed tactical testing. Installed aboard the decommissioned *Cunningham*, Phalanx demonstrated its search, track, fire and target destruction capabilities against glide bombs and a variety of target drones. The tests, which met all objectives, were carried out at San Nicholas Island, Cal. Additionally, Phalanx recently completed both static and dynamic lethality tests successfully.

Convair Excel Award Presented to Johnson

The highest honor in Convair's motivation program has been awarded to Bob Johnson.

The General Manager's Excel Award was presented to Johnson, an advanced systems project engineer, for his efforts in obtaining new missions for Convair's Atlas F launch vehicle. He was singled out as the prime mover in getting NASA to use the Atlas F for its payloads. (*GD World*, Jan.-Feb. 1976).

Chuck Wilson, deputy director for launch vehicle programs, who nominated Johnson for the award, said NASA's decision to choose the F for Seasat and TIROS will add about \$20 million to Convair's firm sales. He said Seasat and TIROS originally were slated for launch atop another vehicle.

"Johnson led an extensive push to capture the missions by developing and presenting better data about Atlas F to the spacecraft contractors, NASA and the Air Force," Wilson said. "His personal time and effort resulted in our proposals gaining favorable consideration from the customer and the missions were then awarded to Convair."



Bob Johnson

According to Wilson, both the Air Force and NASA now utilize the Atlas F thus providing a follow-on opportunity for other missions. Additionally, depletion of the existing Atlas F inventory could result in re-establishment of the SLV-3A as a launch vehicle at the Western Test Range.

Grant Hansen, corporate vice president and division general manager, presented Johnson with the Excel Award plaque and a \$100 U.S. Savings Bond.



Photo By Bob Herrmann

Helios Honor. NASA Group Achievement Awards were made last month to Helios project team members from Convair. Left to right, Chuck Wilson, deputy director of launch vehicle programs; Don Lesney, Bob Benzwi and Frank Anthony, all of LVP; Gil Ousley, U. S. Helios project manager; Marty Winkler and Bill Phillipp, both of LVP; Grant Hansen, corporate vice president and Convair division general manager; and Rich Jumont, NASA resident office chief.

Helios Project Team Receives NASA Award

Six Convair Helios project team members have received National Aeronautics and Space Administration Group Achievement Awards for their roles in the successful launches of two West German solar probes.

Chuck Wilson, Bob Benzwi, Frank Anthony, Bill Phillipp, Don Lesney and Marty Winkler were cited by NASA as "individuals who have distinguished themselves in the cooperative aspects of the United States and German Government/University/Industry project team."

The framed award certificates were presented by Gil Ousley, U. S. Helios project manager at NASA's Goddard Space Flight Center.

Wilson is deputy director for launch vehicle programs at Convair; Benzwi served as mission manager for the Helios project; Anthony was responsible for flight mechanics; Phillipp was the test conductor for both launches; Lesney and Winkler carried out trajectory and mission analysis.

NASA describes Helios as an engineering and scientific triumph which has given mankind its first close glimpse of the sun.

"We clearly recognize that this accomplishment was the result of human endeavor and with this award we pay tribute to a human triumph by honoring some of those who made Helios the success that it is," Ousley said.

Helios A was launched Dec. 10, 1974 by a Titan/Centaur combination and a little more than a year later — Jan. 15, 1976 — another Titan/Centaur sent Helios B on its way.

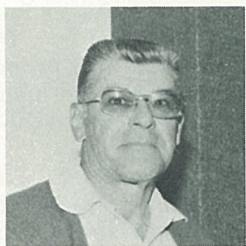
After completing the second two-burn Helios mission, Centaur accomplished five additional engine firings as a bonus. They were made under progressively adverse start conditions and were separated by coast durations of up to 5¼ hours. The last engine firing occurred nine hours after lift-off, demonstrating Centaur's versatility to perform a variety of other missions.



Never Absent. DC-10 assembly departments at Lindbergh Field last month held their annual luncheon honoring employees for perfect attendance in 1975. Awards were presented to 17 employees for their dedication during the year. Pictured at a workstation time-clock are, front row, left to right, Joe Berardini, Mary Jimmerson, Rudy Casados, John Butina and Walt Levandowski. In the middle are Everett Fountain, Guy Rhea, George Lopez, Will Pope, Charles Brink and Al Fuller. Back row, Harry Gaugh, Jim Caldwell, George Marx, Scott Brogan (at clock), George Felton and John Valdez.

Service Awards

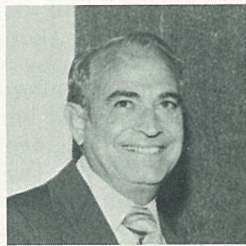
FORTY YEARS —



G. Schicht
Operations



R. O. Funke
Operations



T. C. Berardini
Operations

THIRTY-FIVE YEARS —

Operations — C. L. Good, P. A. Wuthnow, G. R. Mayfield, C. W. Meinsen, R. H. Johnson, L. N. Strong, C. E. Schultz, J. A. Liegl, J. E. Nixon, K. M. Hawkins, R. M. Montgomery, M. A. Stutz, W. S. Rutherford, M. A. Puentes, N. N. Pasich, H. W. Anderson.

Research and Engineering — L. G. Walton Jr., V. J. Schack.

Data Systems Services — C. G. Skeen.

Material — C. T. Talbott, B. E. Smith.

Finance — W. A. Ebel.

Reliability — J. G. Sugg, G. R. Gray, W. A. Wade.

Vandenburg AFB — M. G. Rustin, C. T. Brown.

Savings And Stock Values

The Stock and Saving Plan unit values in dollars for the month of February are shown below:

Salaried:	
Government Bonds	\$1.760
Diversified Portfolio	\$1.297
General Dynamics Stock	\$42.625
Hourly:	
Government Bonds	\$1.758
Diversified Portfolio	\$1.336

31 Years Later, Chinese Medal Finds Milt Ohlman

It's been a long time since Milt Ohlman flew the bumpy air routes of Asia ferrying vital military cargo to World War II bases in China. However, he recently had reason to recollect those days — 31 years ago — when he received the Chinese Nationalist War Memorial Medal for his role in "flying the Hump."

Ohlman, a Convair quality control inspector at the Eastern Test Range, was one of the pilots who flew ammunition, gasoline and other supplies from India and Burma into China in 1944-45. The air route, over a series of high-ridged peaks in the Himalayan Range, became popularly known as "flying the Hump."

"Receiving the medal was a surprise to me," Ohlman said, "though it had been rumored for many years that Nationalist Chinese President Chiang Kai-Shek had authorized it. The National Hump Pilots Association found the rumor to be fact, and the medals were found stored in a Taiwan warehouse."

As an Army Air Corps pilot of a C-47, Ohlman flew the Hump for nearly a year during which time he accumulated more than 600 hours aloft.

"In those days," he says, "we mostly used dirt strips. Some were so short we often had to reduce our cargo weight to get off the ground."

In tracing a typical Hump mission Ohlman says he flew from Imphal, India, direct to Kunming, China, where he refueled, flew north to Chabua, China,

just south of the Yellow River, and then inland to the forward bases.

"Until the fall of Rangoon, we ferried Chinese troops to Burma on the return leg," he says.



Milt Ohlman

Although there was a shorter and more direct course inland to China, the roundabout Hump route had to be followed because the aircraft couldn't make it over the towering Himalayan mountain tops — some more than 25,000 feet high, Ohlman says. A common Hump flight averaged about 600 to 1,000 miles, one way.

Did You Know?

Four submarines built at Groton and delivered to the Peruvian Navy in 1928 were overhauled in 1953. They were still in service in 1960.

GD World

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G. Alexander Smith — Manager of internal communication

Patricia Lewis — Associate editor

Fred Bettinger and Jack Isabel — Contributing editors, Convair Edition

SPOTLIGHT



76 Years Later. One day shy of 76 years after the Holland was accepted by the U.S. Navy on Apr. 11, 1900, the keel of the Ohio, the first of the new Trident missile-firing submarines was laid. The Ohio will be 560 feet in

length — more than 10 times as long as the 54-foot Holland. Silhouettes of the two submarines, drawn to scale, show the size relationship of the two ships.

History Of Silent Service Traced By Pair Of Sister Subs

By Jim Reyburn

The nation's undersea fleet and Electric Boat division have come a long way together since the Navy accepted its first submarine from the company — 76 years and 506 feet, to be exact.

And when the submarine service marked its 76th anniversary Apr. 11, it undoubtedly remembered with a touch of nostalgia the *Holland*, the stubby, cigar-shaped 54-footer it purchased from Electric Boat on the same date in 1900.

By contrast, the first Trident sub-

marine, *Ohio*, whose keel was laid Apr. 10 at the Groton shipyard, will be 560 feet long, and the largest and most sophisticated submarine in the world.

If the *Holland* were placed next to the *Ohio*, it would probably evoke an image of a rowboat lying alongside a Navy cruiser.

At 74 tons, *Holland* would be classed as a flyweight next to *Ohio's* 18,750 tons. Her five-man crew could be a bow mooring detail in *Ohio's* complement of 154 men.

Holland's 50-horsepower gasoline en-

gine might well develop an acute inferiority complex next to *Ohio's* powerful nuclear reactor.

With a top speed of seven knots, *Holland* couldn't begin to touch *Ohio's* capabilities, which, although classified, are certainly more than that.

Holland's dynamite gun could fire a 100-pound projectile half a mile. *Ohio* will be able to launch 24 Trident missiles a good deal further.

Holland's fresh-air supply limited her

to submerged runs of barely 30 hours. *Ohio* will be able to remain beneath the surface indefinitely, limited only by her crew's endurance.

And the *Holland* certainly didn't have a doctor, or a gymnasium, library, study area, nor crew's lounge as the *Ohio* will.

All of which goes to show that *Ohio* and *Holland*, despite their differences, will still be sisters in kind. They'll both be part of the proud heritage of men who go to sea in the "Silent Service."

Ohio Keel Laying ...

Continued from Page 1

will not stand idly by."

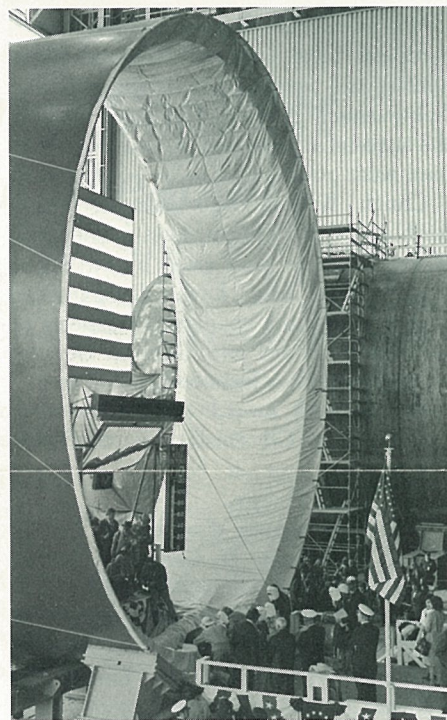
Sen. Taft then gave tribute to the men and women involved in the Trident program:

"We owe our thanks to the many men and women of the Navy, and those in the private industry, who have given their labor to the designing of this tremendously complex system. I am certain the thought and work which these people have given to the nation in the *Ohio* has not been and cannot be compensated materially. We must recognize their efforts above and beyond the call of duty.

"The same is true for the men and women of this shipyard who will devote their many skills to the building of the *Ohio* and later to those who will sail her.

"To all of these people, we and all Americans owe a great deal ..."

The ceremony was attended by J. William Middendorf II, Secretary of the Navy; Admiral H. G. Rickover, director Naval Propulsion Program; Rep. Bob Wilson (R-Cal.); David S. Lewis, GD chairman; and Joseph D. Pierce, EB general manager.



Big "O" Started. The keel-laying ceremony for the Navy's first Trident missile-firing submarine, *Ohio*, culminated when Mrs. Katharine Whitaker Taft welded her initials in the keel plate.

Strong, Vital And Aggressive ...

Continued from Page 1

means that we have to lower our ethical standards."

Shareholders were shown films of two launches of Convair division's Tomahawk and Lewis said the missile's future will be "decided in the months ahead on overall national security grounds."

But, "if the Tomahawk is developed and produced, it will provide a solid line of business at Convair for many years to come," he said.

In the LNG tanker program at Quincy "we have progressed far enough in the production program to believe that we will not have any losses on the eight ships now under contract, but profits will depend on additional orders," he said.

The corporation has been exploring arrangements which would lead to "contracts for more ships while giving the company the opportunity to share in the profits available from owning the ships. We are far along in working out the details whereby the company will be the equity owner of the five ships now on order to carry gas from Indonesia to Japan. We expect this program will lead to the order of two more ships."

Lewis said negotiations with the U.S. Navy, which resulted in a price increase of \$97 million for the first seven SSN

688-class submarines under contract, have also led to an understanding under which the company will submit additional requests for contract changes later this year including proposed price increases for the second increment of 11 SSN 688 submarines.

"We believe that the negotiated contract price increases will insure that Electric Boat will complete this major submarine construction program without incurring any loss. Until we have more experience on the program, we plan to continue our policy of accruing no earnings on the 688 program for the foreseeable future."

Lewis said the sales of Marblehead Lime should pick up as the steel industry strengthens, and "Asbestos operations have made a strong recovery from last year's lengthy strike and fire. Our biggest problems in coal mining at the moment are related to productivity decreases which require constant attention with no easy solution," he said.

Despite a slowdown in the construction industry, Material Service is also performing well, Lewis said.

He also said that the recession impact is still being felt in new equipment orders of Stromberg-Carlson and that "perhaps Stromberg-Carlson's greatest opportunities lie in international sales."

Around the World... ...in GD

At CHQ: Joel Davis joined as staff accountant ... Kristine Nimphius joined as associate auditor ... Lewis Corwin, corporate manager of salaried compensation, was elected to a three-year term on the steering committee of The Aerospace Industries Association's subcommittee on compensation practices.

At Convair: Taylor Tucker joined as assistant marketing director - production systems ... Martin Winkler was promoted to project engineer ... Wallace Withee became director - energy systems.

At Datagraphix: Jim Nicholson has been named regional marketing operations manager ... Jim Blanchard has been appointed manager of purchasing.

At DSS: Roger Barnes was promoted to chief - data systems ... Donald McCarty assumed duties as manager - operation CDSC ... William Conroy transferred to Rochester as manager DSS - Stromberg-Carlson ... Jerome Corbeille became manager DSS Electric Boat ... Francis Connell transferred to Quincy as manager of information systems development ... At WDSC Ronald Voell was appointed chief of data administration ... Guy Mabie was promoted to chief of test and simulation services ... Ken Fleischmann, Bill McDaniel, Bill Franklin, Jr., Larry Freeland, Larry Moon, Gerry Ochoa, Jeff Wilson, Gary Montroy, Pearl Wong and Jody Chambers transferred to DSS San Diego.

At Electronics: Terrill Greenlee joined as principal engineer ... Dan Pressman joined as program manager ... John Dobyne, Jr. was promoted to section head - engineering.

At Electric Boat: Walter Kaczynski has been promoted to manager of manufacturing control at Avenel ... Don Painter assumes duties as facility manager of General Dynamics Manufacturing, Ltd. in Montreal ... David Walden became director of procurement ... Vernon Hawkins was promoted to overhaul program manager ... Richard Suprenant was appointed manager of nondestructive test services ... Donald Smith transferred to Quonset Point as chief of engineering.

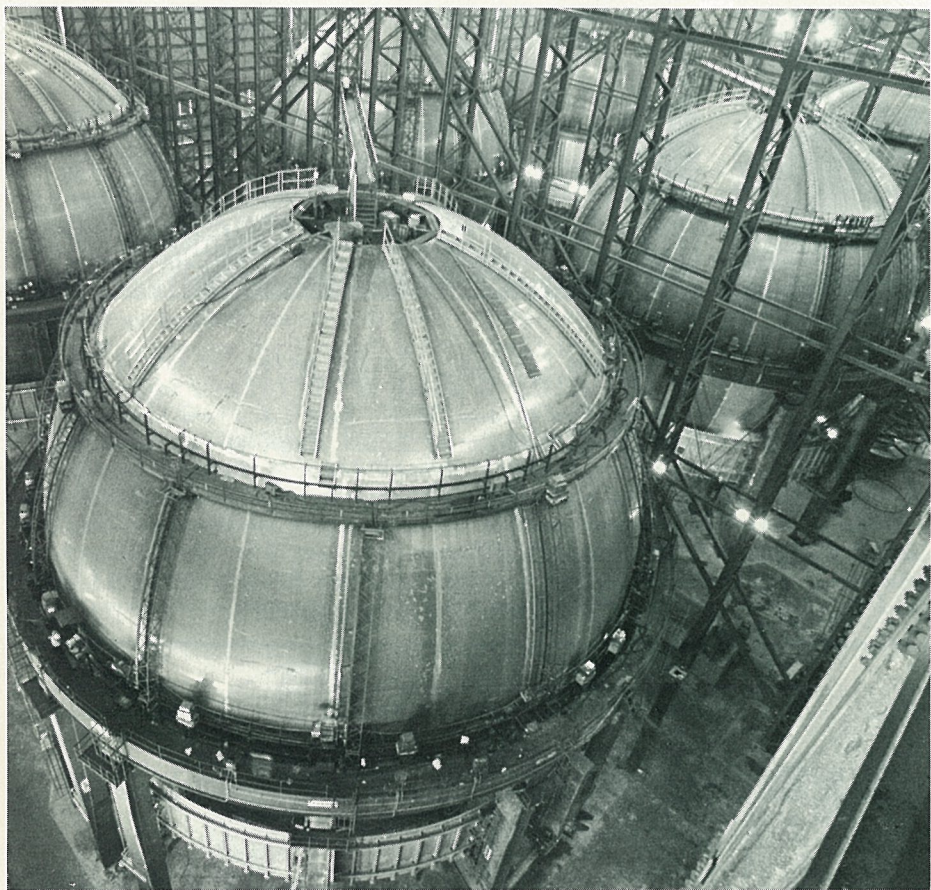
At Fort Worth: Dan Addison became F-16 tooling manager ... Allen Clyde became chief of industrial engineering ... Jerry Cooper was promoted to manager of tooling and support equipment ... George Davis became assistant project engineer ... Joseph Podesta was promoted to assistant project engineer ... Danny Reed was promoted to manufacturing technology supervisor ... Edgar Reynolds became chief of industrial engineering ... Stephen Shelvey became chief of industrial engineering ... Paul Smith assumed duties as chief of manufacturing control.

At Freeman-United: Milford "Doc" Harrel, Freeman-United senior vice president, has been elected vice chairman of the Illinois Coal Operator's Association.

At S-C: George Maruschock joined as technical staff engineer ... Maxine Burton, RN, occupational health nurse at Charlottesville has completed six months of study at The University of Virginia and has become a qualified nurse practitioner in family medicine ... John Miller, plant manager, has been named chairman of human relations and job placement committee for the city of Ardmore ... Thomas Holmes transferred to Rochester as account manager - supplies and is replaced as Northeast region sales representative by Edward Boatwright ... Brian Ormond has been named manager of switching systems and related products in Rochester.

At Pomona: John Bear, reliability manager, gave the keynote address at the annual West Coast Reliability Symposium held in February ... Keat Parra was transferred and promoted to representative - Huntsville ... Monty Dickinson became director manufacturing and material control ... Gustave Goldshine became director manufacturing engineering ... William Govette assumed duties as director manufacturing electronic fabrication ... Kenneth Lake became director manufacturing product line management assembly and test ... William Nelson became director - manufacturing mechanical fabrication.

At Quincy: P. Takis Veliotis, Quincy president, has been elected vice president - Atlantic Coast of the Shipbuilder's Council of America ... Andrew Kim joined as auditor.



Approval Received. The first of the huge aluminum spheres being manufactured for the LNG tankers has received inspection and approval from the U.S. Coast Guard and the American Bureau of Shipping.

First Sphere Approved At Charleston Facility

The main assembly welding of the first of sixty 120-foot diameter aluminum spheres under construction at the Charleston, S.C. facility has been inspected and approved by the U.S. Coast Guard and the American Bureau of Shipping.

After an 8-inch layer of polyurethane insulation is added at Charleston, the 850-ton sphere will be placed on a company-built barge to begin the 1,000 mile voyage to Quincy Shipbuilding division.

The recently-approved sphere will then be installed in the first of 12 liquefied natural gas (LNG) tankers. The 936-foot tankers will each carry five of the aluminum spheres. The spheres will hold 25,000 cubic meters of natural gas in a liquefied state at 265 degrees below zero.

At Charleston, the huge spheres are being manufactured in an assembly-line process that has been called one of the "most unique manufacturing operations in the world."

In December 1974, GD acquired the land-fill site on the banks of the Cooper River from a subcontractor and committed more than \$60 million to the project.

Following the acquisition, plans were drawn for a new facility and a production process which would insure

exact forming and fitting of the sphere sections.

In June 1975, construction began on an assembly building that was 552 feet long, 368 feet wide and 220 feet tall. At the same time, the first of six building jigs began to take shape as parts arrived from Switzerland. The building and the sphere jigs went up at the same time on the same site.

In the fabrication shop, rebuilding began on the furnace which heats each plate to make it pliable for shaping.

The huge forming device was reworked to insure that each plate was curved to exact dimensions.

Ultimately, a production line was established to shape huge slices of aluminum plate to resemble orange peels which would then be laid together in the final assembly jig form with an absolute fit.

In a few weeks, the first assembly jig was up and erection began on the first sphere long before the building was complete. The problems of interference from wind, rain and dust were always present, but the men on the site gained valuable experience in control as well as in using welding chairs and new automatic equipment that literally crawled up the inside and outside of the spheres to weld the seams.

Donald C. Cook Elected to Board

Donald C. Cook, Managing Partner of Lazard Frères & Co. of New York, an international investment banking firm, has been elected to the GD Board of Directors.



Cook

Mr. Cook recently retired as Chairman and Chief Executive Officer of American Electric Power Co. Inc., New York, and has been with Lazard Frères since March of this year.

He is a native of Escanaba, Mich., and was graduated from the Univ. of

Michigan with a bachelor's degree in economics in 1932. In 1935, he received a master's degree in business administration from the same school and earned a Master of Law and Letters degree from George Washington Univ. in 1940. He became a Certified Public Accountant in Maryland in 1941.

Cook then held a number of legal and staff positions in the legislative and executive branches of the U.S. Government and was Chairman of the Securities and Exchange Commission in 1952 and 1953. He was associated with American Electric Power for 24 years prior to his retirement.

Tomahawk Test Flights Continue at Fast Pace Over Missile Ranges

Flight testing of the overland and antiship variants of the U.S. Navy's Tomahawk Cruise Missile is continuing at a fast pace at both the Pacific Missile Test Center at Point Mugu, Calif., and at the White Sands (N.M.) Missile Range.

Last month, a land-attack version of the Tomahawk set new time and distance marks during a fully guided flight at White Sands and an antiship Tomahawk made its fifth successful flight over the Pacific Ocean range.

The overland Tomahawk was launched Aug. 27 over White Sands from an A-6 Intruder and was airborne for 1 hour and 45 minutes while navigating itself 780 nautical miles over the desert test range. It was the third successful test in a series of fully guided demonstrations of the land-attack missile.

The primary objectives of the flight were validation and demonstration of flight control software and continuing evaluation of the guidance, navigation and terrain following systems.

Tomahawk's Terrain Contour Matching (TERCOM) guidance system navigated the A-6 aircraft from takeoff at Point Mugu to the launch point over the White Sands range. TERCOM keeps the missile on course with an on-board computer which compares preprogrammed geographic features on the missile's scheduled flight path with the terrain it actually flies over.

The antiship variant of the Tomahawk, equipped with a modified Harpoon guidance set, was launched Aug. 8 at Point Mugu and tested flight performance, maneuverability and radar altimeter integration. It flew 330 nautical miles and was airborne 44 minutes

after being launched by an A-6. The missile had been used in three previous flights at Point Mugu.

The two missiles flown last month were the first to sport new red, white and blue markings, which are being used to improve visibility for photographic and engineering evaluation.

Both missiles were recovered following successful completion of all planned flight events and each will be refurbished and flown again in the test program.

The winged Tomahawk is powered by a compact turbofan engine which develops more than 300 pounds of thrust at cruise conditions. It is designed for launching from existing submarines, surface ships, tactical and strategic aircraft or land platforms. When launched from ships, submarines or land platforms, the cruise missile uses a solid propellant boost motor in the 7,000-pound thrust class.

Convair division is working under contract from the Naval Air Systems Command on the Tomahawk Cruise Missile air vehicle development. A Defense Systems Acquisition Review Council meeting, which will decide if Tomahawk will enter full-scale development, is scheduled for early next year.

(The following is an excerpt from John E. Moore's foreword to the 1976-77 edition of Jane's Fighting Ships)

"Whilst discussions on SALT II creep on their interminable way, the fact that a U.S. cruise missile with long range and a low altitude capability has now been given initial tests is one of the greatest importance. This could be one of the most significant additions to the U.S. Naval arsenal and a powerful deterrent in future years."

GD Signs Contract with SABCA For Belgian F-16 Coproduction

General Dynamics and SABCA, the Belgian aircraft manufacturer, have reached agreement on a \$106 million (4.9 billion Belgian francs) contract for co-production of the new Air Combat Fighter in Belgium.

Under the multi-million dollar contract, SABCA will fabricate wing and fuselage components for more than 500 of the high-performance fighters, and will assemble and deliver 116 complete aircraft to the Belgian Air Force and 58 to the Royal Danish Air Force.

Work under the contract will be performed at SABCA facilities at Haren and Gosselies. The production program will begin immediately with delivery of the first components scheduled for February 1978. The first SABCA-assembled F-16 is expected to be delivered in January 1979.

SABCA-built aircraft components will also be furnished to F-16 production lines in the U.S. and The Netherlands.

The SABCA contract is a major step in the implementation of the F-16 co-production agreement made last year between the U.S. government and the governments of the four NATO allies which selected the F-16 for their air forces.

Under that agreement, industry in Belgium, Denmark, The Netherlands and Norway will have an important role

in the production of the high-performance, low-cost fighter.

The co-production agreement calls for industry in the four European nations to produce 40 percent of the value of the F-16s procured for their own defense forces, 10 percent of the value of the aircraft ordered by the U.S. Air Force and 15 percent of the value of those procured by other countries.

The four NATO allies announced in June 1975 that they would buy 348 of the multi-mission Air Combat Fighters to replace aircraft in their current fighter fleets.

In January 1975 the U.S. Air Force selected the F-16 as its Air Combat Fighter and announced its intention to purchase 650 or more of the single-engine fighters.

Technical and management representatives from government and industry in the four NATO countries have been participating for the past year in an eight-aircraft pre-production program at Fort Worth division in preparation for initiation of the co-production program in Europe. Representatives of the four countries have also been working at the U.S. Air Force Aeronautical Systems Division headquarters in Dayton, Ohio and with the European F-16 System Program Office in Brussels, Belgium.

YF-16 Begins Avionics Test

YF-16 Number 2 has initiated flight testing of the aircraft's navigation, weapons fire control and flight control systems.

The aircraft was modified at Fort Worth and has begun a six-month first phase of the avionics test program.

The avionics test program includes: — the Fire Control Computer, the heart of the avionics system, which directs and coordinates the entire system to achieve maximum performance;

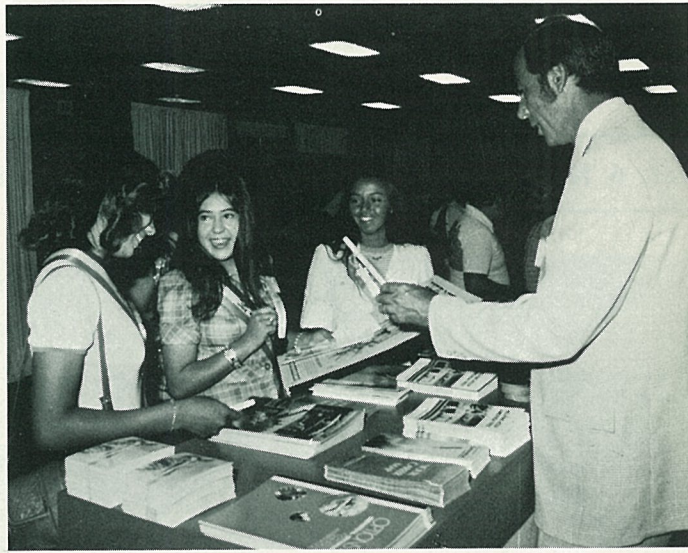
— the Internal Navigation System, which provides the pilot with data to insure accurate navigation and weapons delivery;

— the Head-Up Display, which provides a visual display of information the pilot needs to operate the aircraft and to acquire and fire at air-to-air and air-to-ground targets.

The test will be conducted without the Fire Control Radar, which is undergoing prototype development flight test and is being built by Westinghouse Corp.



GD Display. Last month GD officials attended national conventions of major civil rights organizations as part of the company's continuing efforts to identify and acquaint prospective minority employees with opportunities at GD. The officials attended the American GI Forum, an organization which helps the Spanish speaking, and the National Urban League Conference. In the picture at right, Ray Mendoza, Convair's Manager of Employee Services, talks to three GI Forum participants in front of the GD exhibit at the convention, held in Denver,



Photos by Rick Noel

Colo., July 27 - Aug. 1. In the picture at left, a portion of GD's exhibit is shown at the Urban League Conference held in Boston, Mass., Aug. 1-4. From left to right: Bill Gary, Manager of Equal Employment Opportunity at Pomona; Bill Coleman, Electric Boat's supervisor of Equal Employment Opportunity; Calvin Franklin, Electronic's supervisor of engineering support services; Joe Wiley, Corporate Labor Relations Administrator; an unidentified member of the Urban League, and Jay Colvin, Manager of Personnel Administration at Pomona.

Data Center Moves Into New \$2 Million Facility

The Eastern Data Systems Center (EDSC), which was formerly spread out over three separate sites around Groton, Conn., now has a new home.

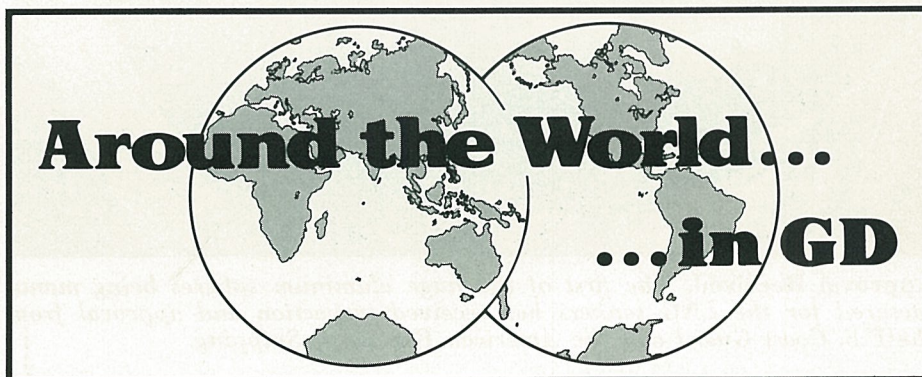
EDSC is now being consolidated in a new \$2 million building in Norwich, Conn., 18 miles from Groton. By early September the personnel and computers had been relocated to the new 70,000 square-foot facility.

"Prior to this move EDSC Groton personnel were located behind the fence at Electric Boat, in a converted grocery store and in an old factory building," says Dan Zimmer, Manager of Industrial Relations at Data Systems Services

in St. Louis. "With this new centralized facility, EDSC is now able to more effectively service the Eastern divisions."

The center's computers handle business and scientific data from General Dynamics' units spread from Quincy, Mass., to Sanford, Fla., and from Charlottesville, Va., to Ardmore, Okla.

Locations are equipped with on-line terminals providing access at Norwich to data bases on subjects which range from scientific calculations to inventory control. In addition to the facility at Norwich, Data Systems Services has computer centers at San Diego and Fort Worth.



At CHQ: Ronald Biller joined as Corporate Pilot . . . John Joice Jr. joined as Financial Analyst - Marine . . . David Perez joined as Corporate Labor Counsel . . . Eugene Lange was promoted to Internal Audit Manager . . . Benjamin McMillan was transferred from WDSC and promoted to Hardware Planning and Acquisition - DSS Home Office . . . John (Rusty) Thomasson was promoted to Manager of Corporate Accounting . . . Charles Buchanan joined as Staff Accountant . . . Richard Eaton was promoted to Controller - DSS Home Office.

At Convair: James Diez was promoted and transferred to CHQ as Manager of Financial Plans and Reports . . . Roy Gilmour returned from the President's Executive Interchange Program and was promoted to Planning Manager . . . Luis Ojeda was named Fourth District 'Citizen of the Month' in July by the San Diego County Supervisor in recognition of Mr. Ojeda's commitment to helping youth . . . Willard Moyer was promoted to Assistant Program Manager — DC-10.

At Datagraphix: John Goulart was promoted to Chicago District Service Manager . . . William Stufflebeam was promoted to Minneapolis District Service Manager . . . Bill Johnson rejoined as Western Regional Marketing Operations Manager . . . Nate Waddington was appointed Manager of Production and Industrial Engineering . . . Jim Cunning was named Manager, Software Planning and Development.

At DSS: Larry Feuerstein was promoted and transferred to EDSC as Manager - Administration and Finance . . . Joseph McBeth was promoted and transferred to EDSC as Director - EDSC . . . Neil Quinn Jr. was promoted to Chief - Data Systems - WDSC . . . Edwin Steinbeck was promoted to Manager - DSS Pomona - WDSC . . . Thomas Latta was transferred to Fort Worth as Systems Accountant . . . Joseph Loria was promoted and transferred to CHQ as Fort Walton Beach Representative.

At Electric Boat: David Dunn was promoted to Director of Facilities Management . . . Paul Demara was promoted to Chief of Engineering Power Generation Distribution . . . James Burns Jr. became Director of Operations and Control . . . Arthur Hounslea became Manager of Planning at a site project.

At Electronics: Richard Bowhay was promoted and transferred to CHQ as Purchasing Agent . . . Carroll Jones was transferred to Orlando as Program Manager - Sandia Program.

At Fort Worth: William Atkins was promoted to Project Engineer . . . Joseph Jopling was promoted to Marketing Manager . . . Don Mazur joined as Manager of Employee Relations . . . Othmar Schwarzenberger joined as Marketing Representative - Senior . . . Kenneth Fuller was promoted to Manager of Procurement Assurance . . . Robert Atchison was promoted to Industrial Engineering Supervisor . . . John Buckner was promoted to Project Engineer . . . Ronald Fischer was promoted to Chief of Procurement . . . Neuman Johnson was promoted to Chief of Procurement . . . David Kruse was promoted to Project Systems Engineer . . . Glen Lemon was promoted to Group Engineer . . . Henry McDonald was promoted to Engineering Program Manager . . . Robert Stodghill was promoted to Project Engineer . . . Olin Weiss was promoted to Product Manufacturing Technology Engineer . . . J. Douglas Wolfe was promoted to Design Specialist.

At Pomona: Essad Tahan joined as Section Head . . . Jack Brady, Edward Hanzlik, Curtis Maddock Jr., Lenard Stuessel and Charles Taylor were all promoted to Product Line Manager . . . Hans-Peter Schmid was promoted to Engineering Specialist . . . Harold Steffen was promoted to Manufacturing Group Engineer - Support . . . Robert Jones, Etric Stone and Donald Wilson were all promoted to Chief of Production Engineering - Support . . . Donald Lynch was promoted to Project Engineer . . . George Lasker was promoted to Engineering Specialist . . . Lloyd Dutcher was promoted to Engineering Manager.

At Stromberg-Carlson: Noble Tombaugh was promoted and transferred to CHQ as Financial Analyst - Commercial . . . David Hinshaw joined as Manager, Logic Design, NSL . . . Paul Kavanaugh was promoted to Director - Switching Systems Design.

At SCCI: Gregory Stark was promoted and transferred to CHQ as supervisor of general accounting.

Management Interns Start Rapid 15-Month Program

Five recent college graduates are being given an accelerated exposure to management functions and responsibilities under the newly organized Industrial Management Intern Program.

"The purpose of the program is to expose the interns to as many different disciplines and work assignments as possible over a period of 15 months," says Arch Rambeau, Corporate Director of Personnel and Management Relations. Mr. Rambeau says the program was originally the idea of James M. Beggs, Corporate Executive Vice President — Aerospace, who thought of it as a program which would provide the interns with a chance for rapid growth and development of their managerial capabilities.

Rambeau says the requirements for the selection are demanding: applicants must have excellent academic records, leadership qualities and, preferably, undergraduate degrees in technical fields coupled with advanced degrees in fields such as finance, industrial management or engineering.

The interns began the program recently with an orientation at corporate headquarters in St. Louis and a visit to

Washington, D. C., to learn about governmental relations. Presently the interns are on rotational assignments at the four aerospace divisions — Fort Worth, Convair, Electronics and Pomona — and at St. Louis.

Myron Borders, selected by St. Louis, is typical of the five interns, and during an interview he said:

"The program gives the interns an opportunity to work right away. We receive assignments immediately so we are contributing from the beginning."

Borders was selected for the program by the St. Louis office where he will return after his assignments to the aerospace divisions.

In addition to Borders, George Widmeyer was selected by Fort Worth, Andrew Johnson by Electronics, Susan Dong by Convair, and Michael Driscoll by Pomona.

Convair Employees Decertify Group

Convair division engineers and other professional salaried employees voted to decertify the United Auto Workers and its affiliate, the National Engineers and Professionals Association, as their representative in contract negotiations with the company. The election was held in early August and the votes were counted in early September.

According to the National Labor Relations Board, the employees registered their decision against continued representation by a vote of 382 to 278 in Unit A, composed of engineers, and 80 to 56 in Unit B, composed of other professional employees.

Savings And Stock Values

The GD Savings and Stock Plan unit values at the end of July 1976 were:

Salaried:	
Government bonds	\$1.8056
Diversified Portfolio	\$1.3010
Hourly:	
Government Bonds	\$1.8048
Diversified Portfolio	\$1.3309
General Dynamics Stock	\$57.50

Two U.S. Air Force Captains Begin Assignment at Convair

Two U.S. Air Force officers have begun a 10-month course in industrial planning and procurement at Convair division under the Air Force Institute of Technology's "Education with Industry" (EWI) program.

The officers are Capt. Jay Johnson, who reports from Kadena AB, Okinawa, Japan, and Capt. David Houlihan from Malmstrom AFB, Mont. This will be the 20th consecutive year the division has participated in the EWI program, which emphasizes industrial management techniques. Nearly 50 career officers have gone through the program since its start.

The officers began the program with a general briefing and orientation on General Dynamics, its organizational structure and product lines. Following 10 weeks of training with various departments, both Capt. Johnson and Capt. Houlihan will be given assignments at the division.

Johnson was an aircraft maintenance officer with the 376th Strategic Wing at

Kadena AB. Prior to his assignment at Kadena, he was stationed at Offutt AFB, Neb., and saw service with the 307th Strategic Wing in Thailand and the 9th Strategic Reconnaissance Wing at Beale AFB, Calif. He received a bachelor's degree in aeronautical engineering from Utah State Univ. in 1962.

Houlihan was a missile combat crew commander with the 490th Strategic Missile Squadron at Malmstrom AFB. He holds a master's degree in systems management from the Univ. of Southern California and a bachelor's degree from the Univ. of Northern Colorado in earth sciences.

Next month, they will attend a symposium for EWI officers at the Air Force Institute of Technology at Wright-Patterson AFB, Ohio. While assigned to Convair they will also visit Corporate Headquarters in St. Louis and the Fort Worth, Pomona and Electronics divisions.



Suppliers' Visit. Visitors and Convair personnel at the Kennedy Space Center, Cape Canaveral, Fla., to witness an Atlas-Centaur launch are (from the left) Robert Gloede, Chemical Energy of California; Harvey Moose, Convair Director of Material; Robert Elkins, KDI Composite Technology; George Jach, Aerospace Supply; Jerry Zahrt, Convair Manager of procurement; Terri Delgado, Del Manufacturing, and Keith Taylor, KDI Composite Technology.

Key Subcontractors See Atlas-Centaur Launch

A Convair-organized visit for 25 key subcontractor representatives to witness a launch at Kennedy Space Center has generated enthusiastic response.

"I have seen numerous films of various missile launchings, but the sight of the orange flame, the clouds of steam and the delayed roar of the engines is a sensation that can only be experienced by actually being present at the launch site," one representative wrote later.

Another letter said, "The liftoff was as spectacular as I expected . . . pleased to have merited the responsibility you entrusted with us."

"This is certainly an interesting program," stated another letter from one contractor after the visit. "Our company is very proud to have played a small part in the missile launch."

The executives, who were present for the first COMSTAR launch, represented 20 companies that provide some critical components for Atlas and Centaur, such as electrical connectors, special valves, pressure transducers and gyroscopes, together with other materials and services.

The visit was part of a continuing effort by the material department and the launch vehicles program office to continue to emphasize the critical need for and importance of highly reliable hardware and materials on the Atlas and Centaur vehicles.

"From the simplicity of nuts and bolts to the complexity of gyroscopes, all must operate at peak performance to ensure a successful space launch," says H. E. Moose, Convair Director of Material.

The group was given a briefing on the COMSTAR mission, the role of Atlas-

Centaur in the launch and a review of the successes of Atlas and Centaur boosters in some of the key space ventures undertaken by the United States.

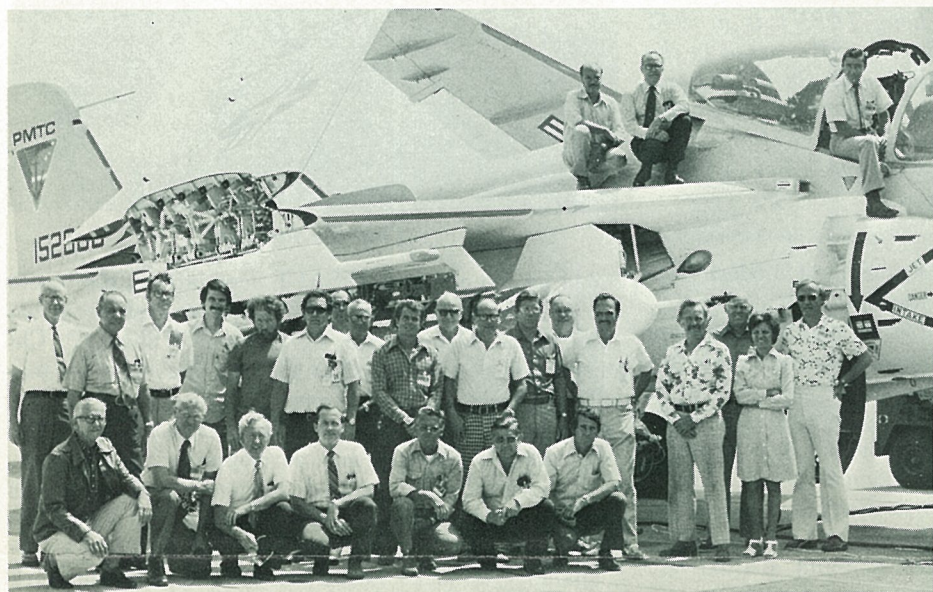
Following a tour of the space center at Cape Canaveral, Fla., the group went to the Convair complex to witness the launch.

The subcontractors who participated were: George Jach, Aerospace Supply; Everett L. Bauer, The Bauer Co.; Milton Brown Jr., Bourns, Inc.; Robert Gloede, Chemical Energy of California; Dallas D. Turner and Harvey C. McLendon, Commercial Coil Spring Co.; Terri Delgado, Del Manufacturing Co.; Henry Comeau and Blair Ross, The Deutsch Co.; Patrick Malmsten and Greg Woessner, Honeywell, Inc.; John W. Rockwood, Hydro Mill Co., and John M. Phipps, ITT Corp.

In addition: Robert W. Elkins and F. Keith Taylor, KDI Composite Technology; Dale Cumley, LaBarge Inc.; Thomas S. Marotta, Marotta Scientific Controls, Inc.; G. Wayne Hawk, Moog, Inc.; Arthur R. Beck, Precision Twist Drill and Machinery Co.; Jim Murphy and Bill Greer, Reynolds Metals Co.; Willard Moline, Rosemount, Inc.; Morris Holowachuk, Servometer; R. K. Dent, Tyee Aircraft Inc., and Herbert C. Hemmenway, USM Corp.



Space Talk. Convair Manufacturing Development Manager Seymour Zeenkov (right) places the Centaur stage atop a model of the Titan-Centaur launch vehicle for Gil Keyes (left), Director of the professional staff of Sen. Frank E. Moss (D-Utah), Chairman of the Senate Committee on Aeronautical and Space Sciences. Looking on are Bill Roberts, Marketing Manager, and Cliff Brewer, Marketing Director.



Mugu Monitors. Tomahawk cruise missile testing at the Pacific Missile Test Center, Point Mugu, Calif., is carried out by an on-site support team from Convair division. Kneeling (left to right) are Bob Peller, Walt Reeder, Joe Conway, Mike Dutcher, Bud Lakin, Ernie Baddams and 'Spurg' Spurgeon. Standing: Frank Carpenter, Joe Stengel, Karl Taylor, George Overturf, Dennis Hyland, Wylie Huffman, Joe Rogers, John Ward, Fred Fowler, Bob Katan, Noel Taylor, Bill Lowe, Bill Arends, Tom Buchanan, Charlie Cogswell, Bob Black, Bev McLendon and Al Cappelen. On the A-6 launch aircraft are Chuck DeMund, who flies photo-chase; Dick Bloom, who heads up the support team, and Ed Emerson, airborne test conductor. Tomahawk flight testing over the Pacific Ocean test range and the White Sands Missile Range, N. M., are being carried out from Point Mugu.

Hacker Awarded A 'Silver Knight'

Al Hacker, Convair division Controller, has received the Silver Knight of Management Award from the Convair Chapter of the National Management Assoc.

The award, which is the highest honor that can be given to an outstanding executive by an NMA chapter, was presented to Mr. Hacker at the association's annual awards banquet.

In recommending Hacker for the award, CMA Chapter President Norm Rutherford said Hacker has always been an active supporter of the chapter and of NMA.

"He has encouraged his group to be active members and personally provided counsel and direct support to the chapter," Mr. Rutherford said.

Ron Leigh, NMA Executive Vice President, endorsed the recommendation and said Hacker's outstanding qualifications and many contributions of leadership are a credit to the management profession.

Service Awards

FORTY YEARS —



C. B. Reid
Operations

THIRTY-FIVE YEARS —

Operations — C. N. James, A. W. Bailey, L. V. Boles, R. Franklin, J. B. Johnson, F. W. Matern, E. H. Johnson, H. L. Teague, H. L. Wade, W. Arends, F. J. Hull, H. F. Lee, R. T. Mulroy, J. J. Severy, G. Tahan, K. W. Camp, H. A. Stroing, R. G. Damschroeder, J. A. Bottom, C. H. Splinter, C. E. Hendricks, C. A. Hagman, R. L. Ingraham, G. Davidson Jr., L. K. Lee, F. E. Reed.

Material — J. Cicalo.

Reliability — M. E. Thomas Jr., D. S. Arnott, W. D. Carpenter.

Research and Engineering — N. J. Kinnischtzke.

Contracts — W. Vierra.

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Trident, Tomahawk Meet Qualitative Naval Challenge of The Future, Deputy CNO Says

(This article is excerpted from an address by Vice Adm. R. L. J. Long, USN, Deputy Chief of Naval Operations (Submarine Warfare), to a recent meeting of the Aviation/Space Writers Assn. in Denver, Colo.)

The submarine world is dynamic and growing. As other branches of the Navy have shrunk in size, the submarine force has grown. The coupling of nuclear power to the submarine created a ship that can not only fulfill the roles of yesterday, but continually assume new tasks.

The submarine has evolved from an antiship platform to an extremely survivable strategic deterrent and the Navy's best antisubmarine warfare platform.

I think submarines have many similarities and interfaces with aviation and space technology. The first and most obvious is the ship control system. You might compare a submarine with a dirigible. It is a platform which, through strict ballasting, is maintained neutrally buoyant and needs only small forces to change its direction or attitude. It has horizontal control surfaces on the sail and the stern or tail and an upper and lower rudder at the stern. These surfaces are controlled in a manner similar to those on an airplane. Movement of these surfaces via electro-hydraulic control systems can be done by manual control or an autopilot system. Normal control tolerances for our modern submarines are a foot of depth, a quarter degree of attitude and a half degree of course.

Second, submarines have been pioneers in the area of atmospheric control. The closed environment of a submarine has provided the basis for medical precedents that have had direct impact on the atmospheric control of our space vehicles.

Modern nuclear submarines have the capability of operating independently of the outside atmosphere for an indefinite length of time. This is made possible by making oxygen through electrolysis of water, oxidizing carbon monoxide, hydrogen and hydrocarbons, and chemically scrubbing carbon dioxide from the air.

Compared to the outside atmosphere, a submarine's air has a somewhat higher carbon dioxide level, but it is purer and freer of bacteria after the first few days submerged. Medical research done by Navy doctors in submarines has shown that this higher carbon dioxide level appears to cause no lasting physical effects, and thus, the concept of space travel in such an environment was proven safe for astronauts.

The navigation of our submarines is an area which has drawn from aviation and space technology. Using an inertial navigation system, a submarine maintains an instantaneous positional display. With an actively radiating echo sounder, submarines can determine their position by terrain contouring of the ocean bottom. From orbiting satellites, accurate fixes are obtained using the known orbit of the satellite and the doppler effect of its transmitted radio signals as it passes overhead.

Just as aircraft travel along routes carefully defined, our submarines operate in a similar manner in home waters. The oceans are divided into transit lanes and operating areas. Before leaving home port, a submarine must have an approved movement plan, like a flight plan, to prevent any two submarines from being at the same point at the same time without some pre-established depth separation.

We are concerned about the rapid progress being made by the Soviets in the design and construction

These factors combine to make the Trident system the most cost effective launch platform we can put to sea today or in the foreseeable future.

of new submarines, as well as the rapid expansion and improved capabilities of their surface combatant fleet.

Unlike us, the Soviets are spending more of their military budget on hardware than on manpower. The Soviets currently outspend us by:

- 25 percent in military procurement
- 25 percent in overall research and development
- 25 percent in general purpose forces
- 60 percent in strategic nuclear offensive forces, and
- 200-300 percent in strategic defensive forces.

The Soviets have a fleet of about 335 submarines of which about 140 are nuclear powered. We have 117 submarines of which 105 are nuclear powered.

The Soviets are building about 10 new submarines a year as compared to our three or four.

The Soviets have built at least eight new classes of submarines in the last 10 years (while) we have built or are building four new classes.

The Soviets have about 65 cruise-missile-firing submarines whereas we currently have none.



Vice Adm. Robert L. J. Long (USN) is a 1943 graduate of the U.S. Naval Academy. He served in the Pacific theater of operations during World War II and in numerous posts until he was named commander, Submarine Force, U.S. Atlantic Fleet in June 1972. In August 1974, he was named deputy chief of Naval Operations (Submarine Warfare).

The Soviets have the largest and most modern submarine building yards in the world.

In the strategic submarine area, the Soviets have over 50 ballistic missile submarines in operation. Included are 17 ships of the new Delta class, with more under construction. The long-range missile that these new ships carry is capable of reaching any target in the United States from great distances at sea.

There is no way that the U.S. Navy can match the Soviets in quantity within the present budgetary constraints. So we have attempted to build qualitatively superior ships. This necessitates the use of the most modern equipment and techniques, such as sophisticated electronic processing equipment, minicomputers and numerous complex sensors. It also requires complex and multipurpose weapons systems. I would like to discuss two of these weapons systems that are products of aerospace industry technology.

First, our new submarine launched ballistic missile, the Trident I. This missile will go into our new Trident submarines and will increase the ocean area in which to hide by more than a factor of 10. The Trident I's 4,000-mile range will allow target coverage from most of the North Atlantic and much of the Pacific Ocean.

This missile, like Poseidon, will have a MIRV capability with a destructive capability that will cover several hundred square miles.

These factors combine to make the Trident system the most cost effective launch platform we can put to sea today or in the foreseeable future.

The second weapons system on which I would like to focus is the cruise missile. There is a lot of play on cruise missiles in the media these days based on the SALT discussions, the budget review and ongoing research and development work.

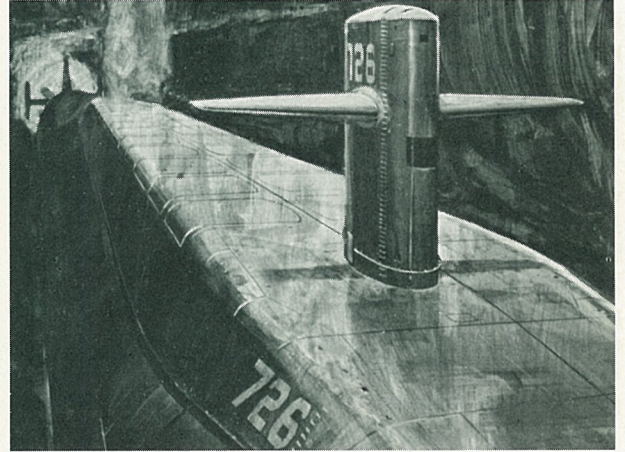
I will only address this subject in the area of the need for this weapon on submarines, although cruise missiles will be carried in increased numbers on air, surface and land platforms.

The historical mission of submarines has been to sink ships. The submarine's ability to strike a ship beyond its defensive weapons range, or a standoff capability, requires a cruise missile.

Gen. George Brown, Chairman of the Joint Chiefs, has said, "The cruise missile is seen to have significant utility for the Navy's vital sea control mission. In any conflict-at-sea scenario, a most deciding factor is long-range firepower."

The first modern cruise missile we plan to put on a submarine is the encapsulated Harpoon. This is the standard Harpoon that the Navy is putting on surface ships and aircraft. It will have a range greater than 50 miles and will have a terminal homing system for its conventional warhead. It is now in the final testing phase, and we hope to start deploying it next year.

As a follow-on to this missile, but not necessarily a replacement, the Navy has the Tomahawk cruise missile, or SLCM (Sea Launched Cruise Missile), now in the early stages of research and development. Planned for initial operational employment at the start of the 1980s, its actual employment will be dic-



The Trident



The Tomahawk

tated by the outcome of SALT negotiations, the results of its research and development phase and budgetary limitations. Deputy Sec. of Defense William P. Clements has said, "I consider the Tomahawk cruise missile program to be the most important program we have under way in regard to its potential, its application, and in research and development."

Let me tell you some of the possible variations of this cruise missile. First, we're looking at ranges out to 2,000 miles. This would give Tomahawk the capability to strike inland targets from the nonlittoral waters of any continent.

Second, the payload of the Tomahawk may be either conventional explosive or a high- or low-yield nuclear

"The cruise missile is seen to have significant utility for the Navy's sea control mission. In any conflict-at-sea scenario, a most deciding factor is long-range firepower"

warhead. I would envision the conventional explosive being used against a ship or, if it possessed sufficient accuracy, against a soft land target.

The nuclear payload has several possible applications. A nuclear payload greatly increases the kill probability of a single shot, regardless of the target. The nuclear variant of Tomahawk could be used in much the same manner as the Poseidon or the Trident missile and represent a lower level of response to a nuclear attack by another country without affecting the security of the normal strategic forces.

Tomahawk is not a replacement for all torpedoes, but, once operational, a small number of them would be carried on each submarine, based on such things as the mission, the threat or the geography.

Two additional design features that go along with these requirements for Tomahawk are terrain contour mapping, which allows Tomahawk to hug the ground, avoid long-range early warning radars, and yet retain high accuracy, and a reduced radar cross-section design, which limits the size of the radar target presented by this weapon.

The Tomahawk program is progressing satisfactorily, but as with all programs that are pushing the state of the art, it has encountered a few problems. The design and development of both a turbofan and turbojet engine to fit within the confines of a 21-inch submarine torpedo tube was a significant challenge.

Likewise, the design of the missile air frame and the internal electronic components to withstand the stringent Class A shock requirements imposed because of a submarine torpedo tube launch, offered another challenge. These and other high technological risk areas have been overcome.

Again quoting Gen. Brown, "... I must caution those who view the long-range cruise missile as strictly a strategic system. The SLCM, like all cruise missiles, is strictly an unmanned aircraft. With the application of current technology, it can be made to perform a wide spectrum of missions."



By Dawn's Early Light. LNG-1, the first of the eight 125,000-cubic-meter liquefied natural gas tankers being built at the company's Quincy Shipbuilding Division, is launched in the dawn's early light on a chilly mid-December morning. Outlined by powerful electric lights, the ship was moved from its building basin to an outfitting pier for dock trials and final out-

fitting. Immediately following the launch, the partially-completed LNG-2 (background) was moved into the vacated building basin where its 136-foot-long bow section and seven-story-high deckhouse will be added. Later this year, LNG-1 will be equipped with the five huge 120-foot-diameter spherical aluminum tanks in which the liquefied gas will be carried.

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Jan.-Feb. 1976

F-16 Finalist in Competition for Japanese Contract

The General Dynamics F-16 Air Combat Fighter has been named one of three finalists in the competition to choose a new fighter aircraft for Japan.

The F-16, designed and developed at Fort Worth, was selected in June 1975 by a consortium of four NATO nations — Belgium, Netherlands, Denmark and Norway — as a replacement for their aging fighter fleets, and in early 1975, the U.S. Air Force selected the F-16 to fill its new Air Combat Fighter role.

The other finalists are the Grumman F-14 and the McDonnell Douglas F-15.

In a statement issued late last month, the Japanese defense officials said a survey team would be sent to the United States in April to study the three contenders. After returning to Tokyo for

further studies, they hope to reach a decision in November.

If selected, the F-16 will be produced in Japan under a licensing arrangement with Mitsubishi Heavy Industries. The licensing agreement differs substantially from the co-production arrangement used in production of the F-16 in the NATO countries, Otto Glasser, vice president-international, said. The Japanese would purchase several completed or partially completed aircraft for familiarization. They would then take over the production of the aircraft in full, manufacturing most of their own parts and assembling the final product.

This exciting new aircraft would then be in simultaneous production on four different assembly lines: in the United States, Belgium, Holland and in Japan.

"If our efforts are successful," he said, "it will be another vote of confidence for the F-16 and an accolade to General Dynamics as a supplier. But, we have an awful lot of hard work still in front of us."

F-16 Takes Shape

The first of eight full-scale development (FSD) F-16s has begun to take shape at Fort Worth. Starting in December, craftsmen began piecing together the many elements of the aircraft's structural backbone, working toward the scheduled completion date of next October.

Aircraft Number One, a single-seat F-16A, will be delivered to the U.S. Air Force in December for flight testing, following two months of ground testing at the Fort Worth plant. The other seven FSD aircraft, two of which will be F-16B two-seat trainer versions, will be completed in 1977 and 1978. The last aircraft is scheduled for delivery in June 1978.

The FSD aircraft will be used to
(Continued on page 2)



Photo by Lucien Vezina

Warpath. This portrait of an Indian chieftain will be the bowpiece for the attack submarine USS Omaha (SSN 692) when it is launched at EB's Groton shipyard. Details of the war bonnet and regalia were taken from authentic Indian garments and relics by EB artist Robert Mariani shown here adding final details to his painting.

Successful Launch Aims Helios-B Toward Sun

Helios B, the second of two spacecraft designed to provide data to help scientists understand the sun's influence on life on Earth, was successfully launched from Cape Canaveral Jan. 15 aboard a Titan/Centaur launch vehicle.

The giant rocket, 160 feet high and weighing approximately 1.4 million pounds before liftoff, roared away from Complex 41 when the launch window opened exactly as planned at 00:34 a.m. EST.

NASA's Titan/Centaur launch ve-

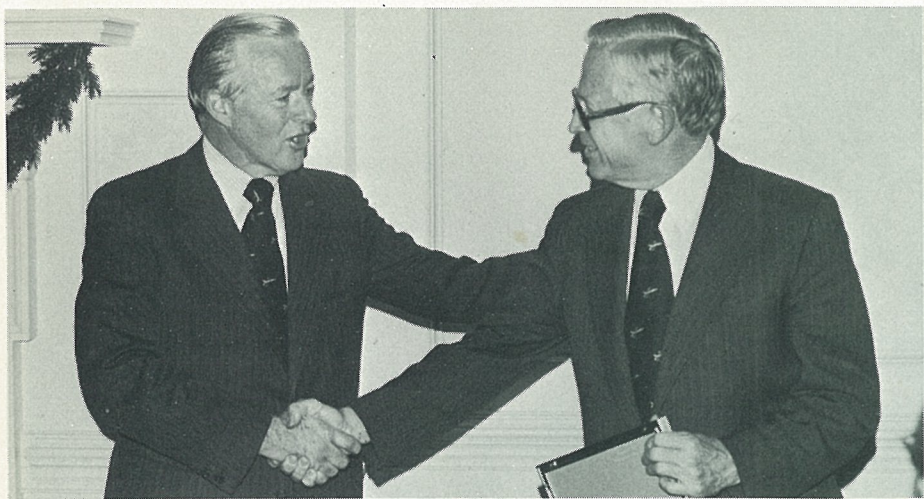
hicle combines General Dynamics' high-energy Centaur, Martin Marietta's three-stage Titan III and, for Helios, a McDonnell Douglas Delta solid rocket motor kick stage.

This was the fifth launch mission for Titan/Centaur. Two were fired in 1974 — a test flight to prove out the vehicles and then the first Helios mission. A dual space spectacular last year launched twin Viking spacecraft to Mars.

Helios B will fly nearer to the sun than any previous man-made object.

According to NASA it will fly nearly two million miles closer to the sun than its predecessor, Helios A. NASA said Helios B will experience about 10 percent more heat than Helios A, whose components already have shown that they can withstand temperatures of 700 degrees Fahrenheit — the melting point of lead — and continue to function well.

Project Helios is a joint space venture between the United States and West Germany.



A Job Well Done. GD Chairman David S. Lewis presents Frederick R. Kearns, Canadair president, with a certificate of appreciation for his long and outstanding service with Canadair. Kearns was attending his final quarterly review meeting in St. Louis in December prior to the sale of the Canadian subsidiary to the Canadian Government. President of Canadair since 1965, Kearns has been associated with the company since 1949.

General Dynamics Sponsors Norwegian Student's U.S. Studies

150 years ago, feeling the economic pressure of a rapidly increasing population, many Norwegians looked to America as their hope, and the emigration of Norwegians to the United States, which began as a trickle, turned into a flood.

Soon, in celebration of the sesquicentennial of that pilgrimage, another Norwegian will be coming to America. Bjørn Larsen, a civil engineer comes, not with a quest for land, but rather with a quest for knowledge. And, unlike his forebears in 1825, Larsen comes with the support of a sponsor — General Dynamics — which has underwritten his studies at the State University of New York at Stony Brook.

A \$5,000 fellowship for studies in engineering has been given to Larsen in commemoration of the 150th anniversary of Norwegian emigration to the United States. Administered by the United States Educational Foundation in Norway, these fellowships are given by corporations with significant interests in Norway. (Norway is one of the European Participating Governments in the F-16 program. See *GD World*, July 1975.)

General Dynamics requested that the fellowship go to a student in engineering

or a scientific field, who is interested in pursuing graduate studies in either marine or aerospace technology. Larsen was graduated from the Norwegian Institute of Technology in Trondheim, Norway, with a degree of *Sivilingeniør*. Larsen is currently a lecturer at the University of Bergen in Bergen, Norway.

While in the United States, Larsen will collaborate with Professor George Stell in the Department of Engineering at SUNY-Stony Brook. He will devote his studies to the statistical mechanics of ionic, polar and polarizable systems. Larsen's contribution to this study will be part of his doctoral thesis.

LAIRD SWALLOW FLIES AGAIN

Fort Worth Artist's Painting Becomes U.S. Postage Stamp

Bob Cunningham's painting will be taking a licking from people coast to coast.

That's because Cunningham, a senior design engineer for 21 years at the Fort Worth Division, was asked by the U.S. Postal Service to conceive the 1976 commemorative stamp marking the 50th anniversary of commercial aviation in the U. S.

Cunningham painted a 7- by 4-inch acrylic portrait of the two vintage aircraft which initiated contract airmail service. They will "fly" again on March 18, 1976, when the 13-cent stamp is officially issued.

In the upper left portion of the stamp is the Ford Pullman monoplane that completed the first contract mail flight on February 15, 1926, from Dearborn, Mich., to Cleveland, Ohio, and back. Below the Ford plane is the Laird Swallow

Atlas F Selected as Launcher for Eight Weather Satellites

Convair's Atlas F launch vehicle has been selected to launch a series of eight weather satellites through 1981 in a joint program sponsored by NASA and the National Oceanic and Atmospheric Administration (NOAA).

NASA also chose the Atlas F to boost Seasat-A, a new ocean survey satellite slated to go into orbit in 1978.

The selection of Atlas F represents a significant break-through for the company since it is the first time that this model of the famed Atlas has been designated for a NASA payload, said Ben Wier, Atlas program manager.

"These new missions illustrate an expanding use for the F, which over the years has proven to be a reliable launcher for the Air Force in development of improved re-entry vehicles, and more recently for orbiting vehicle space applications," Wier pointed out.

Wier said the weather satellites are part of the TIROS/NOAA program for which NASA chose the Atlas F over the Thor/Delta. Atlas F will first launch TIROS, an advanced prototype environmental monitor in the first quarter of 1978. Seven of these third generation meteorological satellites will follow and will be designated NOAA-A through -G. All will be launched from the Western Test Range at Vandenberg Air Force Base in California.

TIROS, which is being developed by RCA's Astro-Electronics Division, will be placed in a 450-nautical-mile circular orbit. The satellites will orbit the Earth every 1.7 hours or approximately 14 times each day.

Mission objectives for the TIROS, ac-

cording to NOAA, are to improve the method of obtaining environmental data and to improve data handling and relay capability. The satellite will gather weather information and telemeter it to NOAA's data processing facilities in Maryland.

Seasat-A, the first research and development oceanographic satellite, is scheduled to be launched aboard an Atlas F vehicle with an Agena upper stage in the spring of 1978 from the Western Test Range. It is being designed and manufactured by the Lockheed Missiles and Space Company.

Seasat-A will be placed in a near-polar orbit and will circle the Earth 14 times daily, covering 95 percent of the oceans each 36 hours. Satellite sensors will provide radar images of waves and ice fields; determine ocean topography, tides and currents; and measure wave heights, lengths and directions.

According to NASA, the first global-scale observation of ocean surfaces will make a major contribution to a better understanding of the oceans.

Surplus ICBMs Become Atlas Fs

Atlas Fs are surplus intercontinental ballistic missiles (ICBM) which are restored to space flight configuration by Convair personnel. The surplus ICBMs are stored at Norton Air Force Base in California and refurbished by Convair crews at the company's facility at Vandenberg Air Force Base.

"Except for the tanks and engines, the majority of the missile's components are replaced," said Bob White of Convair's launch vehicle programs department. All functions are recertified following modification of the guidance and electronics systems."

To date, Convair launch operations crews have modified and launched 53 Atlas Fs from Vandenberg. White said 39 Fs must still go through the Vandenberg Atlas Modification Program (VAMP).

Convair operations at Vandenberg date back to 1958. It was then called Cooke Air Force Base and was a former Army infantry training camp. The facility was renovated for its role as a missile center with the former GD Astronautics Division as integrating contractor for construction and implementation of the Atlas weapons system for the Strategic Air Command.

On Sept. 9, 1959, the first Atlas (12-D) fired by a Strategic Air Command launch crew thundered off its pad at Vandenberg to a target in the Pacific Ocean.

F-16...

(Continued from page 1)

demonstrate the new Air Combat Fighter under operational conditions before the beginning of full-scale production. They are expected to be the forerunners of as many as 1,200 production aircraft to be ordered by the U.S. Air Force. Contracts for an additional 348 of the low-cost, high-performance fighters have been received from four European countries — Belgium, Denmark, The Netherlands and Norway.

Under a co-production agreement between the United States and the four NATO nations, F-16s for the Belgian Air Force and the Royal Danish Air Force will be assembled in Belgium, while another assembly line in The Netherlands will assemble aircraft for that country and Norway.

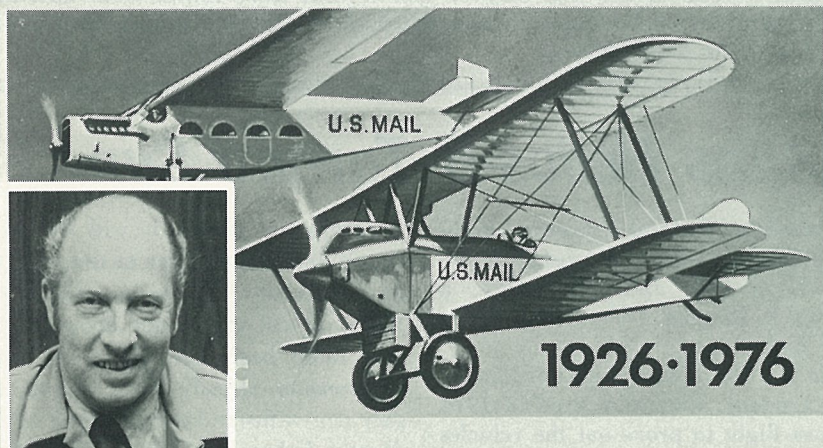
Delivery of the first production aircraft ordered by the U.S. Air Force is planned for second half of 1978, with the first European aircraft delivered shortly thereafter.

SAVINGS UNIT VALUES GIVEN

The Savings and Stock Plan unit values for the month of December are shown below.

Salaried:	
Government Bonds	\$ 1.740
Diversified Portfolio	\$ 1.179
General Dynamics Stock	\$37.62
Hourly:	
Government Bonds	\$ 1.739
Diversified Portfolio	\$ 1.210

Commercial Aviation



Vintage Aircraft. Fort Worth Artist Bob Cunningham (inset) and his design of the U.S. Postal Stamp commemorating the 50th anniversary of commercial aviation in the U.S.

biplane which flew the mail from Pasco, Wash., to Elko, Nev., on April 6, 1926.

Although the aviation commemorative is Cunningham's first stamp design, he has been sketching, painting and building planes for most of his life. Cunningham's lithographs of the General Dynamics F-16 Air Combat Fighter and the F-111 tactical fighter bomber grace the walls of aviation enthusiasts' offices and homes around the world.

Cunningham says that one of his proudest moments came when the Postal Service unveiled his stamp design at a meeting of the board of directors of the Air Transport Association. The board is comprised of the chief executive officers of 14 U.S. airlines.

The Fort Worth veteran's affair with airplanes goes back to the time when, as a child, he used to sell soda pop bottles to buy copies of *Air Trails* and *Air Progress* magazines. About that time also, he remembers climbing aboard aviation pioneer Clarence Chamberlain's biplane at Meacham Field for a cruise around Fort Worth. "I remember flying over the stockyards and being impressed by the size of cattle from the air," he says.

Appropriately, Cunningham participated in the Navy preflight program at Texas Christian University while majoring in art there.

Cunningham says that his stamp design is "the most satisfying thing I've ever done. It will last forever as part of the history of U.S. postage stamps." The Fort Worth artist spent about two weeks of evenings researching and painting the master for the stamp.

After noting that the commemorative stamp will be issued at Chicago's O'Hare International Airport, the nation's busiest, Cunningham cited a less spectacular but more intriguing fact. Stuffed in nooks and crannies not occupied by the mail on that first Laird Swallow flight was perhaps the world's first air shipment of Idaho potatoes.

Space Shuttle Dome Caps Scheduled for Shipment

The first production dome caps for the Space Shuttle external tank are scheduled for shipment this month by Convair to Martin Marietta's Michoud facility in Louisiana.

Convair Program Manager W. S. "Pop" Stroud told key representatives from NASA's Marshall Space Flight Center and Martin Michoud, that the company was nearing completion of the development program.

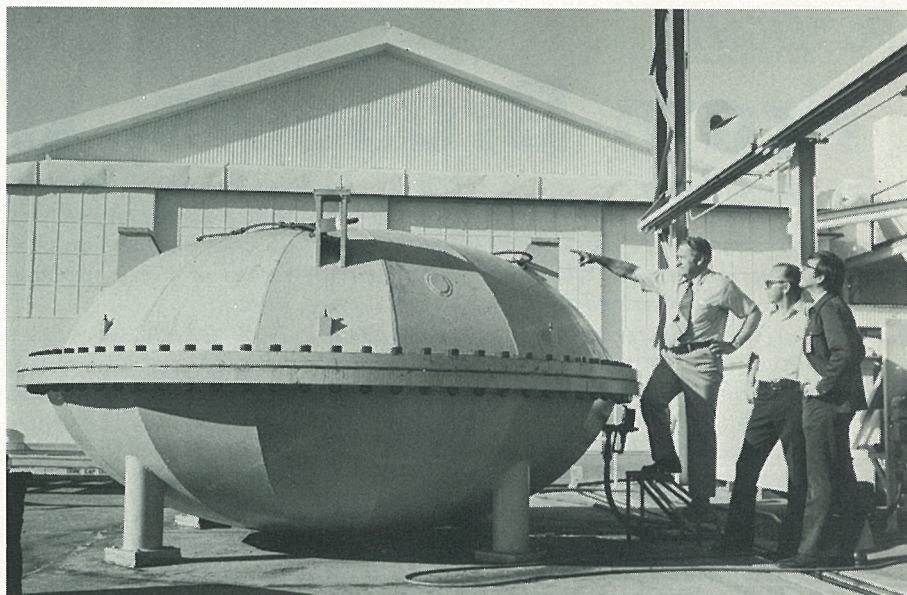
Convair is fabricating nine ship-sets under a \$1.25 million subcontract from Martin Marietta. Each ship-set is made up of three dome caps for the Space Shuttle's liquid oxygen and liquid hydrogen tanks. The dome caps are 13 feet in diameter and weigh approximately 100 pounds.

According to Stroud, large circular plates for the caps are being machined on a numerically controlled profile mill at the Lindbergh Field plant. The pre-machined plates, made of weldable aluminum, are then formed in a Convair-built, saucer-shaped form die.

"The bottom half of the die is filled with water," Stroud said. "The plate is

placed on the bottom half of the die. The top half, which contains the shape of the finished part is then lowered and both halves bolted together." Stroud said hydraulic pressure is then applied to the bottom half which forces the water up against the part for forming against the top.

The visitors from Marshall and Martin Michoud were in the plant last month for a factory tour and a first-hand look at the dome cap hardware and the external tank tools which Convair is also fabricating for the Space Shuttle. Convair will build the tools which Martin Michoud will use to assemble tank skins. The tooling work is being done under a separate subcontract from Martin Michoud for \$1.7 million.



Flying Saucer? What appears to be a vehicle from outer space is actually a Convair-built form die used to shape dome caps for the Space Shuttle external tank. Ready for forming task, left to right, are John Zamiska, tool project engineer; Don Krantz, senior manufacturing development engineer; and Chuck Bennett, engineering chief for the dome cap program.

Social Security Base Boosted

The Social Security taxable wage base was boosted for 1976 to \$15,300 of annual income, \$1,200 above the previous rate of \$14,100 in effect during 1975.

GD employees who earn \$15,300 or more this year will pay a maximum of \$894.25, an increase of \$70.20 over the 1975 maximum of \$824.05.

However, the FICA tax rate will continue at 5.85 percent. Therefore, there will be no increase in the annual Social Security Tax deduction for employees earning \$14,100 or less.

For General Dynamics' employees working in California, the California State Disability Insurance rate remains at one percent of the first \$9,000 of annual income. The maximum 1976 total per employee is \$90.

General Dynamics matches employees' contributions to FICA Social Security, dollar for dollar.

Bussey Retires After 47 Years of Service

Robert A. Bussey, a 47-year veteran of GD, retired last month after serving 13 years as corporate manager of insurance.

Bussey began his life-long career with GD in the final and wing assembly departments of Consolidated Aircraft, later to merge with Vultee which later became a part of GD.

When Consolidated Aircraft moved from New York to San Diego in 1935, Bussey, who had worked his way through college there, made the journey as well. An assistant treasurer, he stayed in San Diego until 1962 when he moved to New York headquarters of GD as corporate manager of insurance.

In 1971, when corporate headquarters changed locale to St. Louis, Missouri, Bussey moved and stayed until his retirement last month.

Con-Trib Club Pledges Quarter Million Plus Dollars

It is said, "money can't buy happiness," but for the United Way and the Combined Health Agencies in San Diego, money can buy help for the sick or the unfortunate.

The Board of Directors of the Convair Employees' Con-Trib Club has approved a pledge of \$292,000 on behalf of the membership for allocation to the United Way and the Combined Health Agencies Drive (CHAD).

The Con-Trib gift was pledged last month and will become part of a general fund which the United Way and CHAD will administer to support nearly 100 human and health care agencies in the community, said Ray Mendoza, manager of employee benefits and chairman of the Employees' Con-Trib Club committee.

"Although our civic pledge is important in supporting community needs, the club's Emergency Aid Fund is equally important in helping Convair families struck by unexpected financial crises," Mendoza commented.

He said a recent week-long membership drive increased Con-Trib participation to more than 87 percent, bringing membership to 5,770. Nearly 40 percent of the members are Fair Share givers. A major share of funds is earmarked each year to United Way and CHAD. However, 10 percent of Con-

Trib contributions go into the Emergency Aid Fund.

Through September, nearly \$32,000 had been distributed from Emergency Aid to more than 100 employee families. Most aid has been for hardships resulting from disability or death in the family, or from overwhelming medical expenses not covered by insurance.

Over the 23 years of operation, Con-Trib has contributed more than \$10 million toward improving the community and the well-being of those living in the Greater San Diego area. Approximately \$9 million has gone to health, youth, welfare and educational services through regular allocations to the local

United Way and other deserving agencies. Over the years, another \$1 million was granted to assist Convair employees through the Emergency Aid Fund.

Con-Trib money is administered by a 16-member employee committee, appointed jointly by management and employee-representative labor organizations. Committee members are: Mort Blatt, Gerry Christ, Mac McIntosh, Betty Krohn and Mendoza, Convair; Charlie Keeth, Johnny Payne, Darlene Sanderson and Harry Turner, IAM; Joe Dvoracek, EAA; John Glover, UAPP; Jack Martin, IBEW; Bob Volle, IUOE; Marv Holmberg, Art Medrano and Ed Stelmach, CMA.



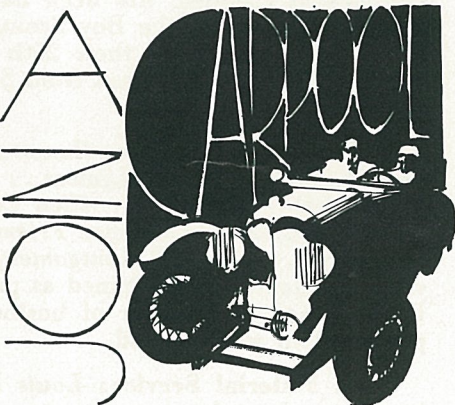
A Quarter-Million Plus. The board of directors of the Employees' Con-Trib Club has approved an allocation of \$292,000 to the United Way/CHAD campaign. Con-Trib Club officials who made the pledge last month are, seated, left to right, Harry Turner, Darlene Sanderson, Johnny Payne, Jack Martin and Art Medrano. Standing, left to right, Joe Dvoracek, Charlie Keeth, Ray Mendoza, chairman, Mort Blatt, Ed Stelmach, Bob Volle and John Glover.

'Mac' Laddon Dies At 81

Isaac M. "Mac" Laddon, pioneer aircraft designer who made major contributions to the growth and reputation of Consolidated Aircraft Co., forerunner of Convair, is dead at 81.

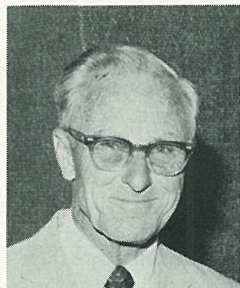
Laddon, an original engineer at Consolidated Aircraft Corp., was famed for his success in the design and production of large bombardment aircraft and flying boats, including the B-24, B-36, and the PBV Catalina.

Laddon was a director of Consolidated Aircraft and later executive vice president of Consolidated Vultee. He was also a member of the board of General Dynamics. Laddon retired from the company in 1968.

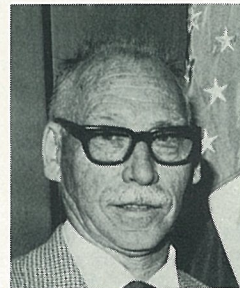


Service Awards

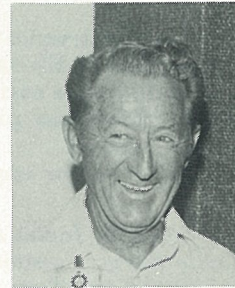
FORTY YEARS —



Al Fink
Operations



Gil Peyton
Research and Engineering



M. J. "Matt" Willows
Operations

THIRTY-FIVE YEARS —

Operations — L. E. Turner, C. E. Schultz, H. B. McIntosh, R. L. Weide, E. C. Cheney, L. W. Patterson, N. Sainz, E. G. Gray, C. L. Holland, M. Frankel, T. B. Rogers, E. L. Risner, C. E. Caffey, W. C. Griffin, W. A. Reusch, L. Maciel, L. P. Petersen, C. E. Heller, W. L. McBride, A. C. Martin.

Finance — R. T. Bauman and H. P. Williams.

Research and Engineering — C. J. Bolin, C. F. Osberg, D. T. Ostenso, R. L. Benson, B. J. Campbell, W. A. Nordstrom.

Material — R. A. Dirkschneider.

Launch Vehicle Programs — L. W. Kerner, M. C. Rustin Jr., L. E. Ohem.

Reliability — A. L. Sack, D. B. Seaburg, C. R. Mabry.

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Patricia Lewis — Associate Editor
Fred Bettinger and Jack Isabel — Contributing Editors, Convair Edition

SPOTLIGHT

From Brussels, With Love . . .

By Peter K. Connolly

(To support the F-16 coproduction program in Europe, approximately 70 Fort Worth Division employees and their families will relocate by 1978 to Norway, Denmark, The Netherlands and, chiefly, Belgium. Thus far during this Bicentennial year, some 30 of these employees, their wives and their children, are slated to make the 5,046-mile move from northeast Texas to Brussels. For most, it will be their first visit to Belgium's capital city, headquarters for NATO, the Common Market . . . and, now, General Dynamics' F-16 Multinational Program. What will their impressions be of this 1300-year-old European city at the crossroads of Europe? Undoubtedly, much like those experienced by the "advance guard" families of Clark Richardson, Joe Stafford and Bill Goodwin, already on the scene — or by corporate advertising manager Peter K. Connolly, who here describes his first visit to Brussels.)



Pigeons enjoy a Sunday midafternoon feeding while a small boy practices soccer in one of Brussels' innumerable churchyards.

Brussels in midwinter. A continuing conflict of leaden skies and red knitted mufflers. Wheeling flocks of pale blue and mud-colored pigeons, settling upon scraps of bread scattered across a cobblestoned park walk.

A polyglot of sights and sounds that assault the senses. A profusion of languages that bespeak just some of the country's diverse ancestry. Dutch . . . Spanish . . . Austrian . . . French . . . Dutch (again). Today? About 51% Dutch-speaking Flemings and 33% French-speaking Walloons. Plus another 16% of mixed heritage.

To a transplanted Texan, the city will seem half a solar system removed from Fort Worth. No SAC-based, hang-winged giant B-52s to greet the early morning riser here — and no fast-climbing sun to burn off the chill. Only a wavering stream of bicycles, motor scooters and headlighted autos probing the gray, vaporous fog that shrouds the wide boulevards. And maybe, by early afternoon, a few thin shafts of sunlight warily reaching the rooftops.

Taxi? If you're going far, be prepared to discuss terms beforehand. However, no extra charge for your driver's unsolicited observations. ("American? Oh . . . my mother . . . she from Brooklyn . . . a very nice place, no? Me . . . cannot go . . . *huit* babies . . . you see, too much.") And, in taxis as well as in all local restaurants, the tendered tab already includes the *pourboire* (tip) — 20% for drivers and 15% for table service.

And food. This is Mecca for members of the menu mystique. But start the day light — a continental breakfast on the Stateside circuit translates in Brussels into a one-third size cup of coffee with four times the body and flavor of its U.S. counterpart, plus a hot, buttered calorific *croissant*.

No escape all day for the weightwatcher. Slabs of rich Belgian chocolate. Pyramids of cheeses. Thick-crusted creamy pastries. Buckets of Brussels' best mussels and the lure of dark, Belgian-brewed *Stella Artois* beer beckoning from every *brasserie* (beer-garden).

Pace the pedestrian traffic along the Boulevard Waterloo. Enjoy a hot powdered waffle and a surfeit of offerings from a thousand shop windows. Onions, bunched bananas, sausages and salamis hanging together from racks. Finely-worked fabrics of fragile lace. And gaudy, clay copies of the ubiquitous *Manneken-Pis*, the city's oldest "citizen."

Everywhere, endless trolley tracks and attendant overhead grids of cable. A side street detour reveals

sea gulls aligned on a fluted, peaked rooftop, then vanishing in a gush of yellow smoke that pours suddenly from a cannon-barrel chimney. A kerchiefed woman slowly exits from a 14th-century church, a small dog bundled inside her worn, black overcoat.

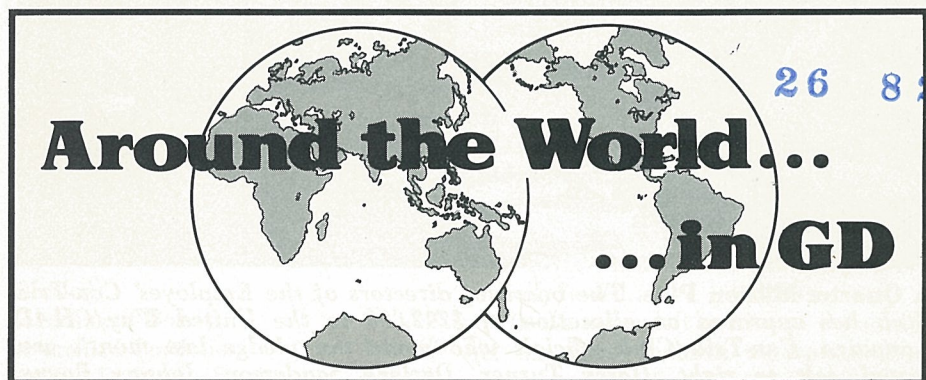
At the corner, a patchwork of political posters and graffiti proclaim quotes from Salvatore Allende and a four-year-old announcement of the Belgian Magic Team's *Bal Costume*.

Brussels — a strong sense of the past mixed with the prosperity of the present. A city of endless allure. A city meant to endure.



Photos by Pete Connolly

A gypsy woman and child walk a fragmented back alley in the shadow of one of Brussels' high-rise luxury hotels. Today's more affluent "bohemians" or "heathens," as the French and Dutch call them, travel by motorized trailer rather than horse-drawn caravan.



At CHQ: Robert Donnelly was promoted to internal audit specialist . . . Otto Glasser, vice president - international, discussed his experience with foreign military sales at an executive seminar held in Washington, D.C., last month . . . Philip Ford was promoted to controller and transferred to Avenel . . . Robert Widmer will be general meeting chairman of the AIAA Aircraft Systems and Technology meeting to be held in September in Dallas.

At Electronics: James Collins joined as principal engineer . . . Recent promotions at Electronics include Franklin Brown to staff engineer . . . C. Bowen to senior cost administration analyst at Orlando . . . In San Diego . . . Roger Sloan was promoted to field engineer . . . Pete Weston to senior budget analyst . . . Don Wallace to project field engineer . . . and John Dolloff to senior engineer.

At EB: James Fantarella was promoted to manager of Engineering . . . Leslie Burgess assumed duties as chief of engineering . . . William McElroy became chief of engineering . . . Paul Morosky was promoted to chief of engineering.

At Fort Worth: Harold Bean was promoted to manager of industrial accounting . . . George Foster Jr. became assistant project engineer . . . Billy Kidwell was promoted to design specialist . . . Chester Cecil, director of F-111 logistics projects, has been elected chairman of the product support committee of the Aerospace Industries Association . . . George Bright, chief, technical publications, has been elected chairman of the service publications committee . . . Neil Clanton assumed duties as project manager . . . James Ashton became manufacturing management support director . . . Charles White was promoted to manufacturing director.

At Convair: Howard Auten Jr. became project engineer senior . . . Gus Grossaint transferred to Fort Worth as production manager - European

program office . . . Melvin Male was promoted to program group engineer . . . Howard Bonesteel was promoted to program manager - LVP . . . Earl Godenschwager was promoted to engineering chief.

At Quincy: James Foss was promoted to director of industrial relations . . . Robert LeMasters joined as manager facilities and maintenance . . . Patrick Loftus from Charleston facility to Quincy as manager quality assurance & weld engineer . . . John Worton to Quincy from Charleston as material controls manager . . . Robert Lutzky joined as manager of labor relations.

At S-C: Michael Oglo joined as senior patent attorney . . . David Paull was promoted to engineer, staff industrial . . . Milton Clement assumed duties as principal engineer . . . John Clary has been named to the new position of operations program manager . . . Celebrating 30th service anniversaries at Rochester are Charles Rood, Harold Toomey, Robert Lake and Walter Wenzel . . . Catherine Grundman and Lucy Malta are observing their 25th . . . Twenty-year veterans are Betty Judge, Roy Scranton, Gerald Hasman, Carol Pommerening, Dorothy Brewer, Lyndal Santini, Vito Bruscatto, Elmer Flood and Juanita Roesch . . . At Ardmore, Oralee Fisher has been promoted to production supervisor and Ray Ferguson has been named foreman. In Rochester, Richard Wheeler, Leo Byrd and Frank Minardo observed their 30th service anniversaries. Those with 25 years are Frank Colangelo, Robert Hopkins, Vincent Vazzano, Merita Vollbracht and Charles DeLoose . . . 117 employees with 1,585 years of combined service were guests at a service award luncheon at Charlottesville, including 60 with 10 years, 27 with 15 years and 29 with 20 years in 1975 . . . Ardmore Plant Manager John Miller has stepped aside after a year as president of the Chamber of Commerce . . . Donald Mack has transferred from Rochester to Ardmore as foreman of the XY switch line . . . Donald Lemmon, industrial relations manager at Ardmore has been named chairman of the citizens advisory committee of the Salvation Army . . . John Coons, manager of industrial relations at Camden, has been named to the board of directors of the regional division of the Boy Scouts of America . . . Willard Wilson and Kanie Keef celebrated their 25th service anniversaries at Sanford . . . Richard Powers transferred from Sanford to Kansas City as regional sales manager.

At Pomona: Leighton Hanon Jr. assumed duties as project engineer . . . Uwe Ibs became group engineer . . . Alan Brunelle was promoted to assistant project engineer . . . Allen Calcote Jr. became group engineer . . . Patrick Engstrom, Lawrence Friemel and Edward Jeffrey became design specialists . . . Frank Montgomery Jr. became engineering group supervisor . . . James Henri joined as production superintendent . . . Raymond Wells joined as manager of business planning . . . Raymond Smith was promoted to section head.

At Material Service: Louis Ellison joined as manager of employee benefits and services.